

**HUAWEI TECHNOLOGIES CO., LTD.**

Application  
For  
Certification

**FCC ID: QIS-WS329**

**300Mbps Wireless Router**

**Model: WS329**

**WiFi Transceiver**

Report No.: 130410015SZN-002

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-12]

Prepared and Checked by:

Approved by:

Sign on file

Eason He  
Engineer

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Billy Li  
Supervisor  
Date: 23 April 2013

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
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- The evaluation data of the report will be kept for 3 years from the date of issuance.

TRF no.: FCC 15C\_Tx\_b

**Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch**

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MEASUREMENT/TECHNICAL REPORT

HUAWEI TECHNOLOGIES CO., LTD. - MODEL: WS329

FCC ID: QIS-WS329

This report concerns (check one) Original Grant  Class II Change

Equipment Type: DTS - Part 15 Digital Transmission Systems (WiFi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes  No

If yes, defer until : \_\_\_\_\_  
date

Company Name agrees to notify the Commission by: \_\_\_\_\_  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes  No

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-12 Edition] provision.

Report prepared by:

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### List of attached file

<b>Exhibit Type</b>	<b>File Description</b>	<b>Filename</b>
Cover Letter	Letter of Agency	agency.pdf
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 1**

### **SUMMARY OF TEST RESULTS**

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### 1.0 Summary of Test

**HUAWEI TECHNOLOGIES CO., LTD. - MODEL: WS329**

**FCC ID: QIS-WS329**

TEST	REFERENCE	RESULTS
Max. Output power	15.247(b)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

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## **EXHIBIT 2**

### **GENERAL DESCRIPTION**

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### 2.0 General Description

#### 2.1 Product Description

The Equipment Under Test (EUT) is a 300Mbps Wireless Router with internal WiFi function operating at 2412-2462MHz for 802.11b/g/n-HT20, 11 channels with 5MHz channel spacing. EUT operated at 2422-2452MHz for 802.11n-HT40, 7 channels with 5MHz channel spacing. It is powered by AC/DC Adapter (model: HW-120050U1W) with input of 100-240VAC, 50/60Hz and output of DC12V, 0.5A. For more detailed features description, please refer to the user's manual.

Type of Modulation: BPSK, QPSK, 16QAM and 64QAM.

Antenna Type: Integral Antenna.

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

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### 2.2 Related Submittal(s) Grants

This is an application for certification of:

DTS- Part 15 Digital Transmission Systems (WiFi transmitter portion)

Remaining portions are subject to the following procedures:

1. Receiver portion of WiFi: exempt from technical requirement of this Part.
2. Data Transfer and other function:  
(Report No.: 130410015SZN-001, 130410015SZN-003).

### 2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009) and KDB 558074. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “**Justification Section**” of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

### 2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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## **EXHIBIT 3**

### **SYSTEM TEST CONFIGURATION**

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### 3.0 System Test Configuration

#### 3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by the AC/DC adapter (model: HW-120050U1W) which is supplied by 120VAC, 60Hz of AC mains during the test. Only the worst case data was reported.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

#### 3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

Power Parameters of IEEE 802.11b/g/n

Test software setting of IEEE 802.11b/g/n			
Channel No.	Output Power	Data rate	Modulation type
1,6,11	15.0	802.11b: 1-11Mbps	802.11b: BPSK
	20.0	802.11g: 6-54Mbps	802.11g: BPSK, QPSK, 16QAM
1,6,11	18.0	802.11n-20M: 6.5-130Mbps	802.11n: BPSK, QPSK, 16QAM,

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3,6,9	19.0	802.11n-40M: 13.5-270Mbps	802.11n: BPSK, QPSK, 16QAM, 64QAM
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On 802.11b/g mode, only one antenna is used for transmission; on 802.11n (20MHz & 40MHz) mode, both antennas can be used for transmission simultaneous.

### 3.3 Special Accessories

N/A

### 3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

### 3.5 Equipment Modification

Any modifications installed previous to testing by HUAWEI TECHNOLOGIES CO., LTD. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

### 3.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
Laptop	Lenovo	T420
Hard Disk	Smart.drive	HD-003
USB Cable	Smart.drive	Unshielded, Length 155cm
1394 Cable	Smart.drive	Unshielded, Length 180cm
LAN Cable*5	N/A	Unshielded, Length: 200cm
Router*4	TP-LINK	TL-MR11U
AC/DC Adapter (marketed in one package with the EUT)	Huawei	HW-120050U1W (Input:100-240V,50/60Hz; Output: 12V, 0.5A)

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## **EXHIBIT 4**

### **MEASUREMENT RESULTS**

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.      Date of Test: 23 April 2013  
 Model: WS329

### 4.0 Measurement Results

#### 4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

- The antenna power of the EUT was connected to the input of a spectrum analyzer. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.
- The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set according to the FCC KDB 558074 spectrum analyzer's integrated band power measurement function with band limits set equal to the EBW band edges and power was read directly in dBm. External attenuation and cable loss were compensated from the measured value.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

For antennas gains is 8 dBi. The maximum allowed Transmitter output is 30-2=28 dBm).

IEEE 802.11b (Antenna Gain =5 dBi) (BPSK, 1Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	15.54	35.81
Middle Channel: 2437	15.19	33.04
High Channel: 2462	14.68	29.38

IEEE 802.11g (Antenna Gain =5 dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	20.79	119.95
Middle Channel: 2437	20.63	115.61
High Channel: 2462	20.26	106.17

IEEE 802.11n 20M (MIMO)(Antenna Gain = 8 dBi) (16QAM, 13Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	20.20	104.71

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Middle Channel: 2437	19.34	85.90
High Channel: 2462	18.67	73.62

IEEE 802.11n 40M (MIMO) (Antenna Gain = 8 dBi) (64QAM, 27Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2422	19.91	97.95
Middle Channel: 2437	19.72	93.76
High Channel: 2452	19.49	88.92

Note 1: For MIMO system of 802.11n 20MHz and 40MHz, total power is calculated by combining the output power of each antenna according to KDB662911.

Note 2: In MIMO, two WiFi Antenna are correlated, Directional gain =  $G_{ANT} + 10 \log(N)$   
 $\text{dBi} = 5 + 10 \log(2) = 8 \text{ dBi}$  according to KDB662911.

Cable loss: 0.6 dB    External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

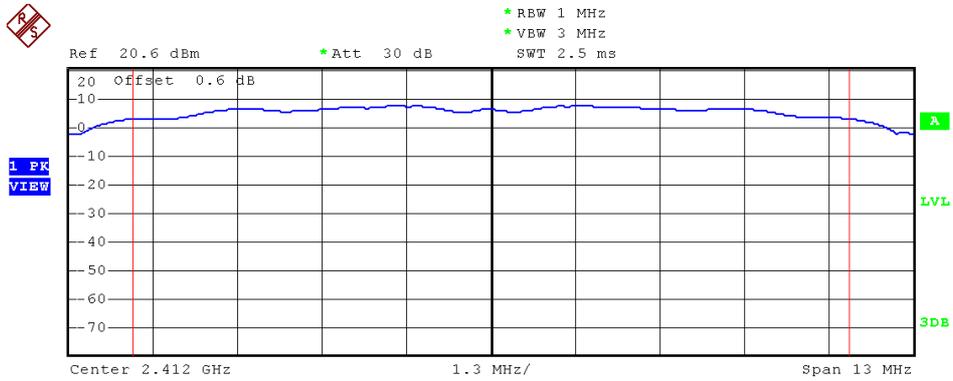
EUT dBm max. output level = 20.79 dBm

For RF Exposure, the information is saved with filename: RF exposure.pdf.

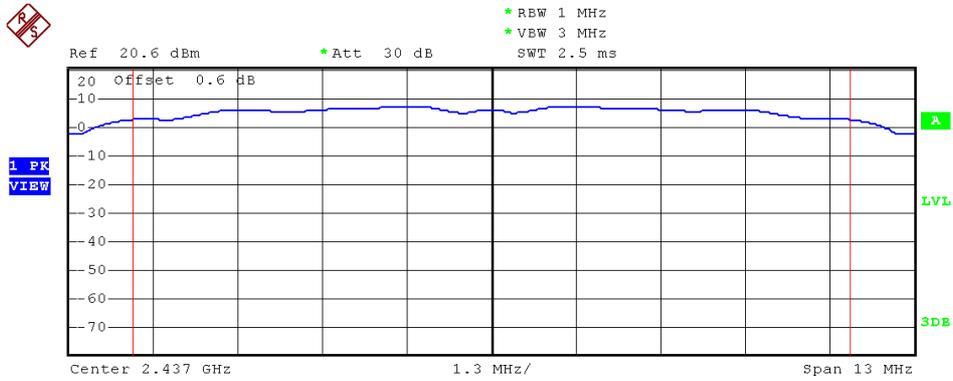
The test plots are attached as below.

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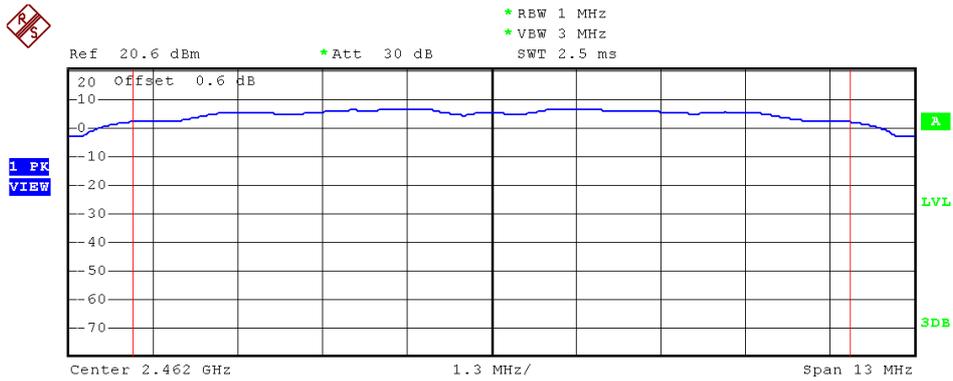
802.11b



**Tx Channel**  
Bandwidth 11 MHz Power 15.54 dBm



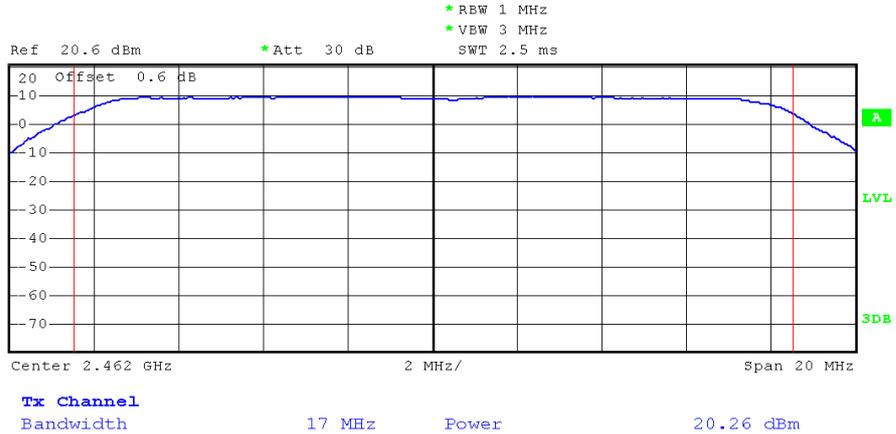
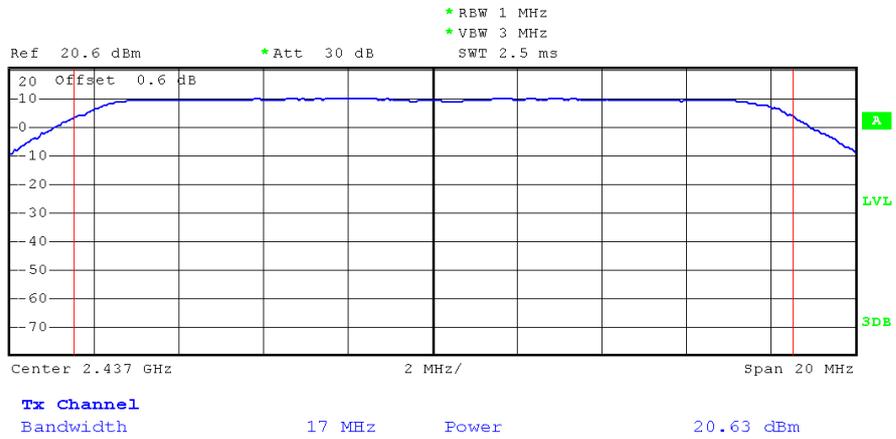
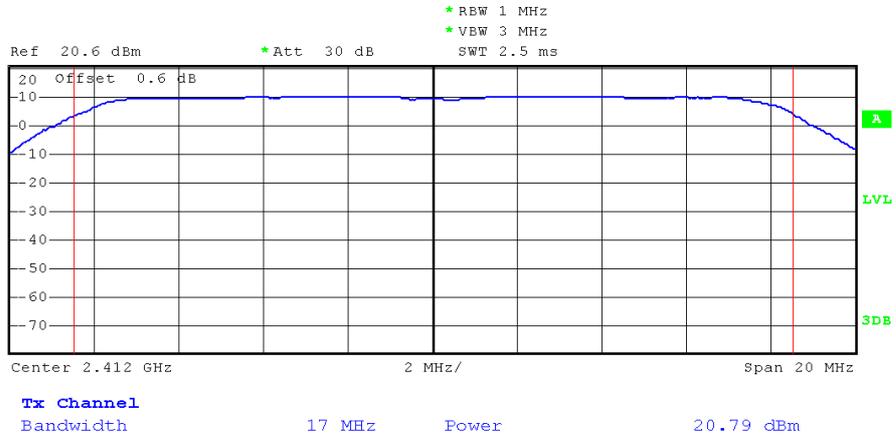
**Tx Channel**  
Bandwidth 11 MHz Power 15.19 dBm



**Tx Channel**  
Bandwidth 11 MHz Power 14.68 dBm

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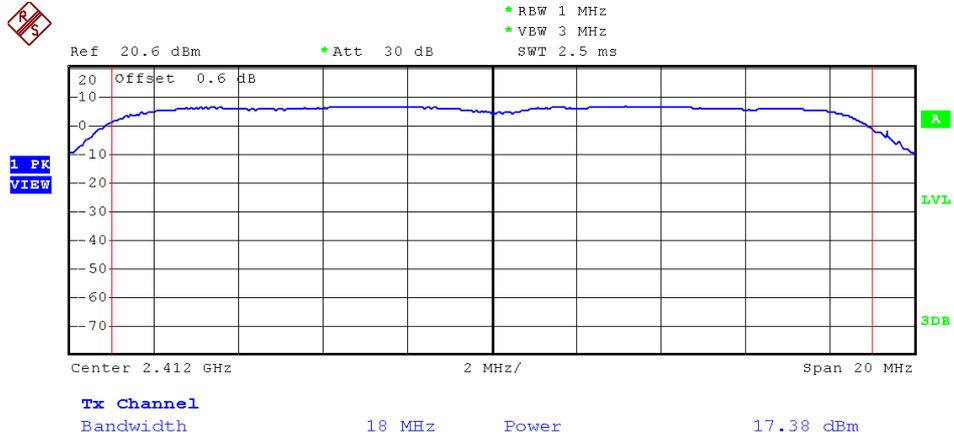
802.11g



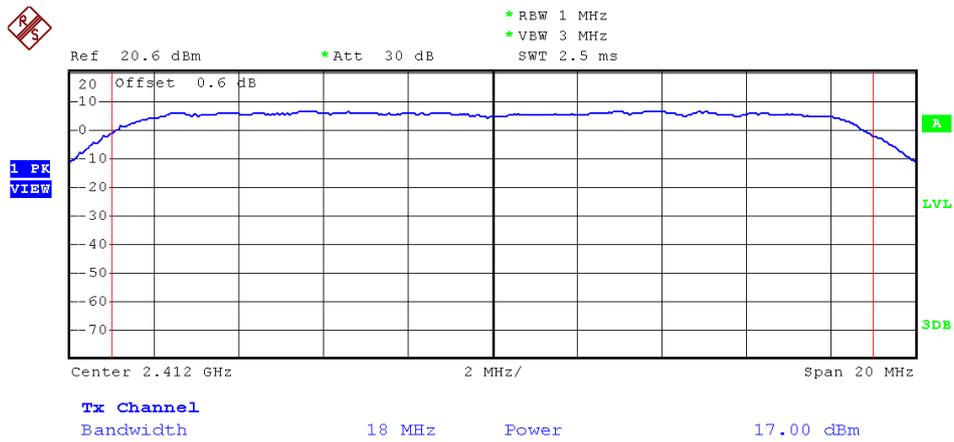
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## 802.11n (HT-20) MIMO

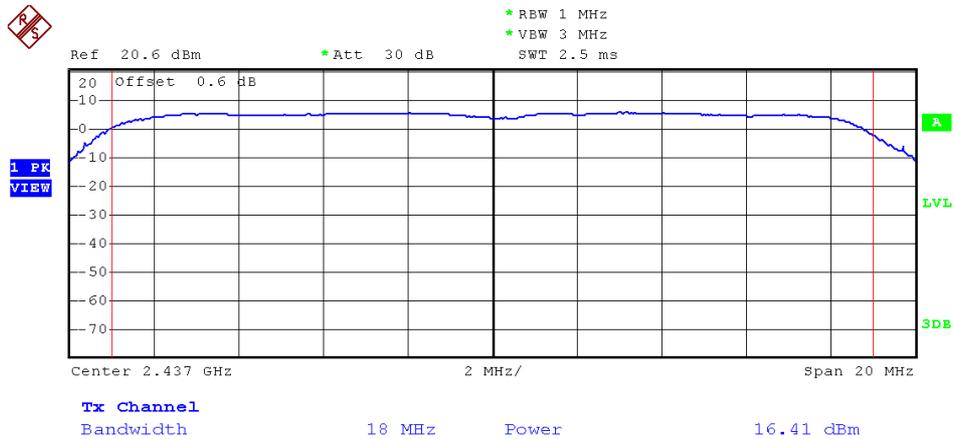
### Channel 01 ANT 0



### Channel 01 ANT 1

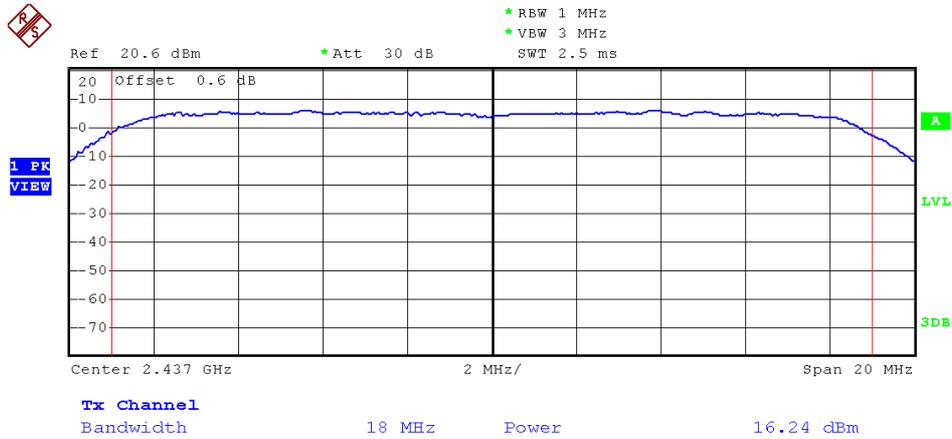


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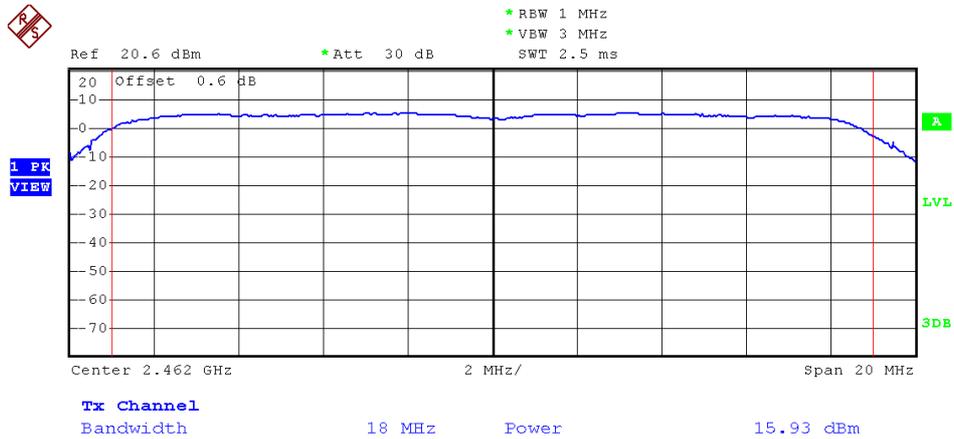


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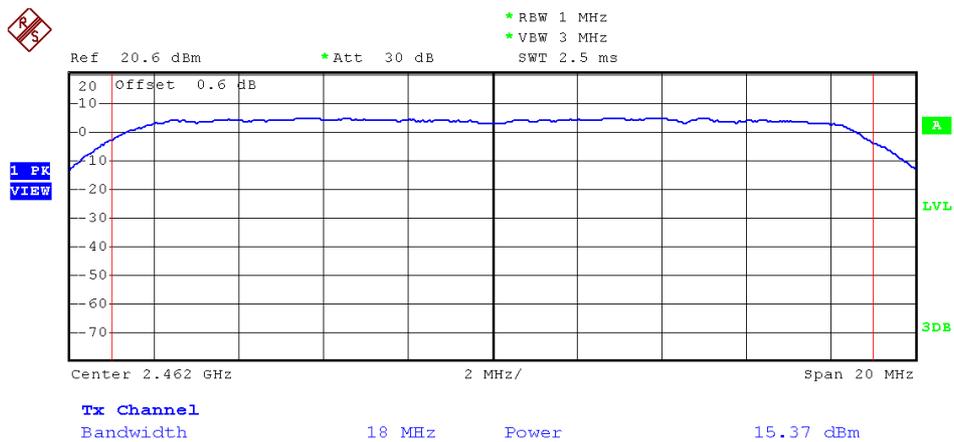
## Channel 06 ANT 1



## Channel 11 ANT 0

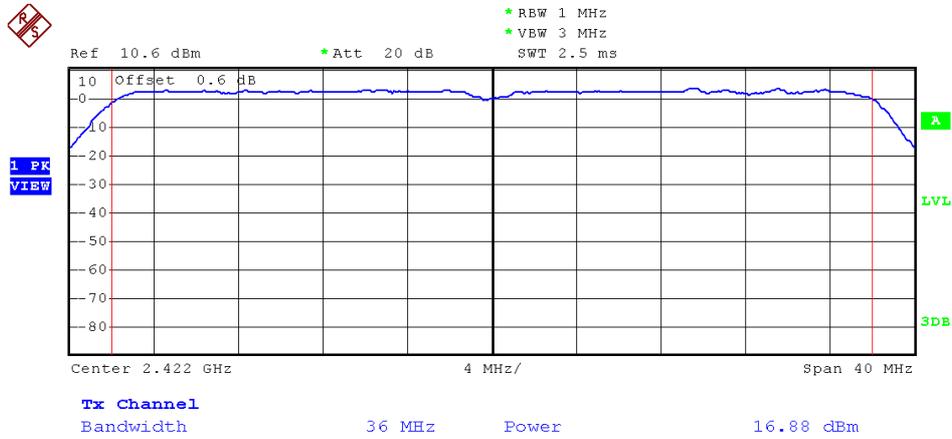


## Channel 11 ANT 1

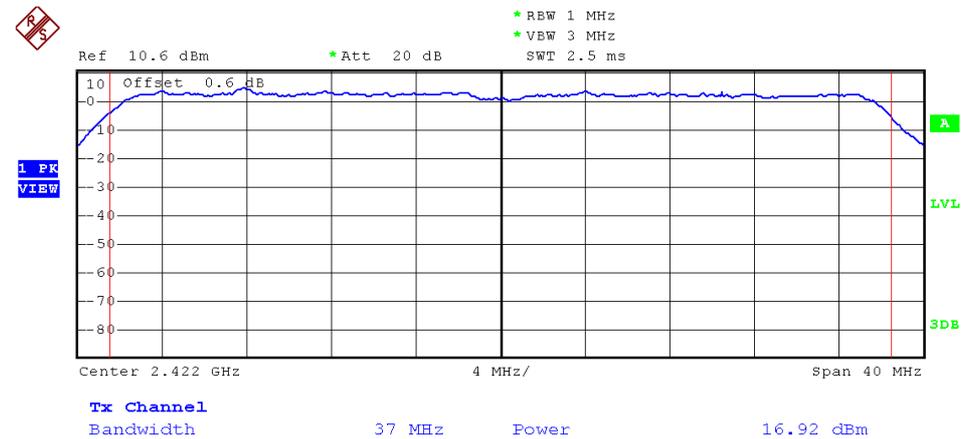


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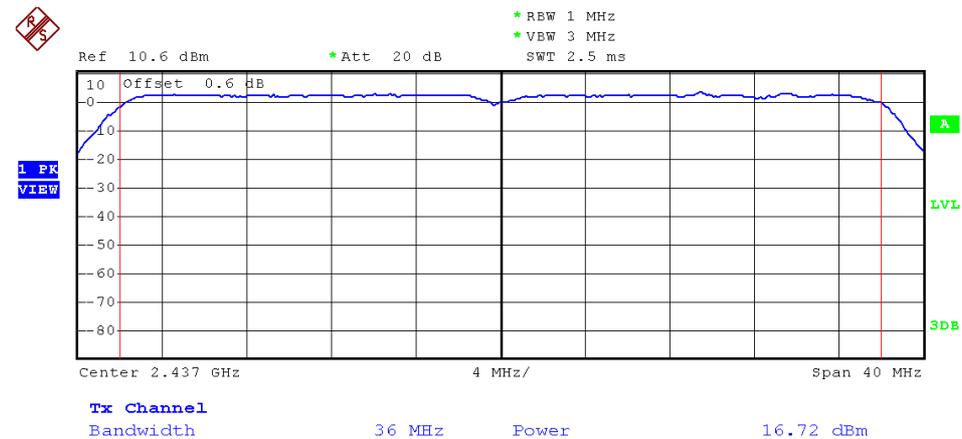
## 802.11n (HT-40) MIMO Channel 03 ANT 0



## Channel 03 ANT 1

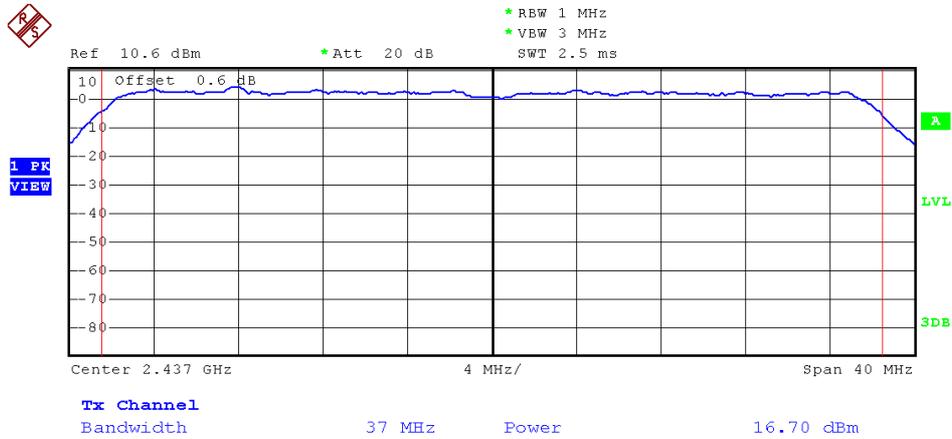


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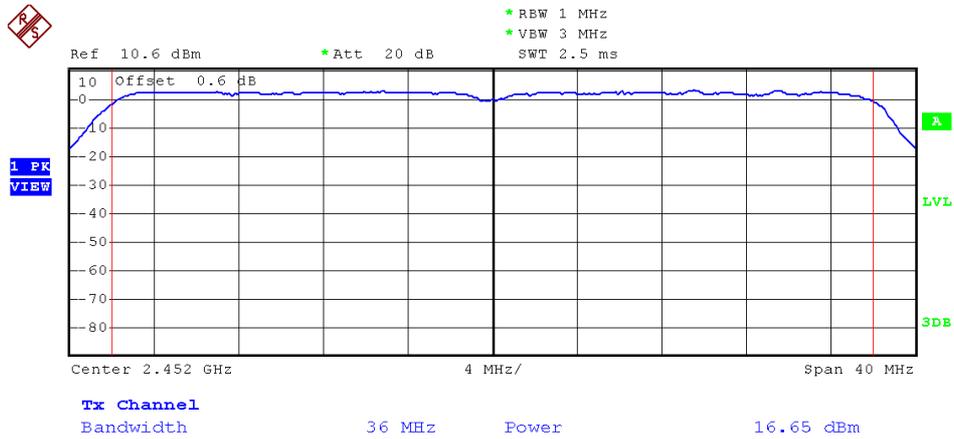


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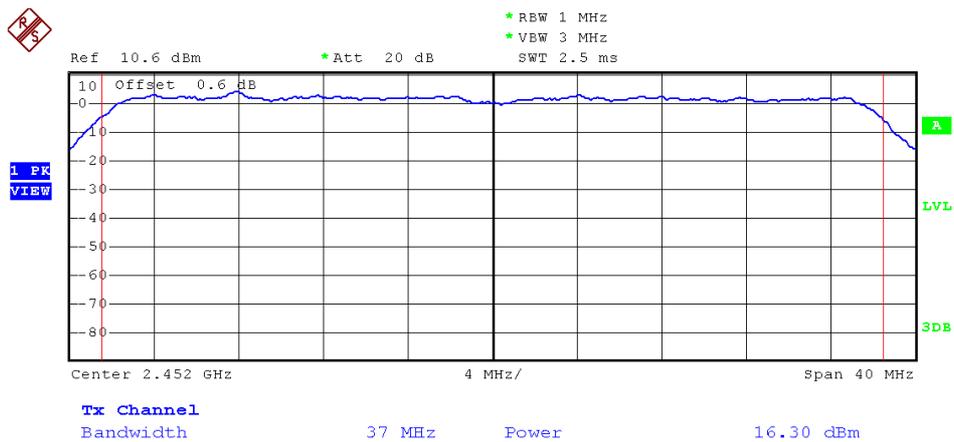
## Channel 06 ANT 1



## Channel 09 ANT 0



## Channel 09 ANT 1



## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.  
Model: WS329

Date of Test: 23 April 2013

### 4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was set to 100 KHz according to FCC KDB 558074. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

IEEE 802.11b (BPSK, 1Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	10.24
2437	10.24
2462	10.24

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	16.44
2437	16.40
2462	16.44

IEEE 802.11n 20M MIMO(16QAM, 13Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	17.16
2437	17.16
2462	17.56

## INTERTEK TESTING SERVICES

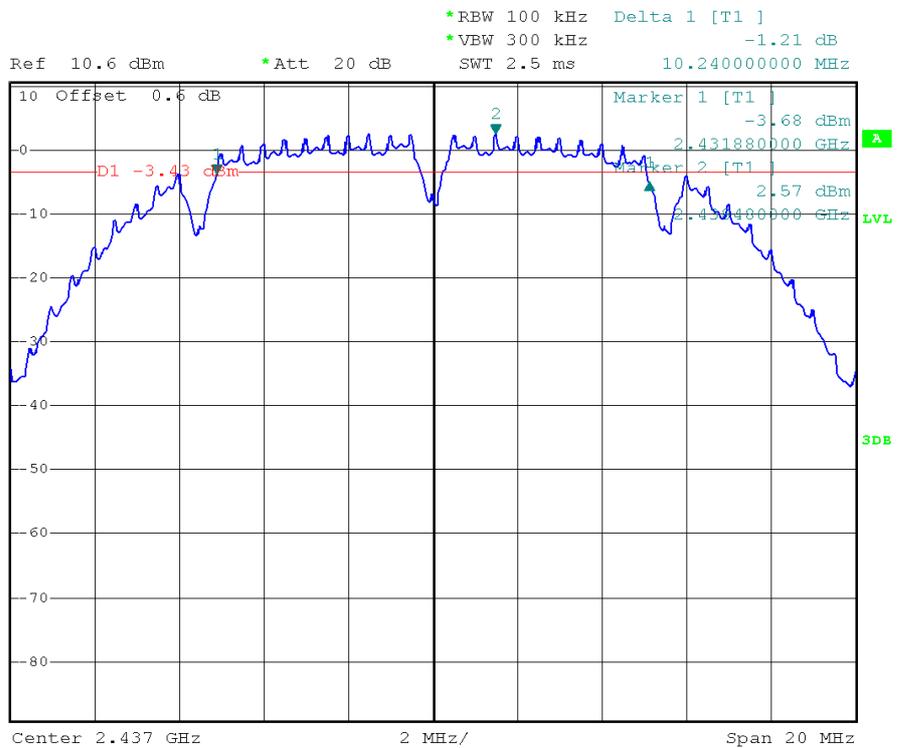
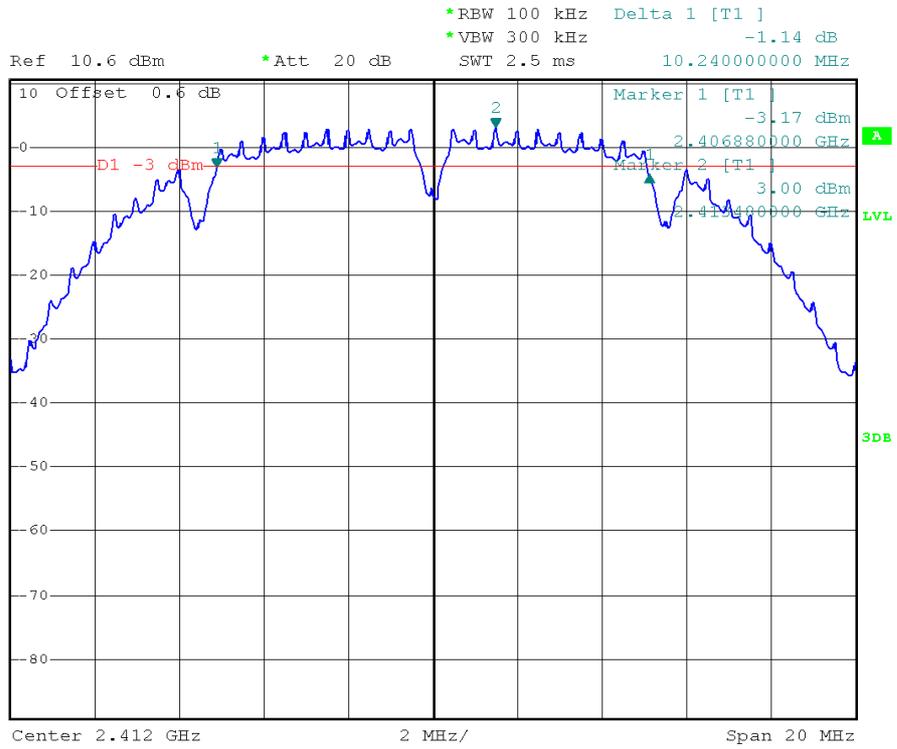
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IEEE 802.11n 40M MIMO(64QAM, 27Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2422	35.84
2437	35.76
2452	35.48

The test plots are attached as below.

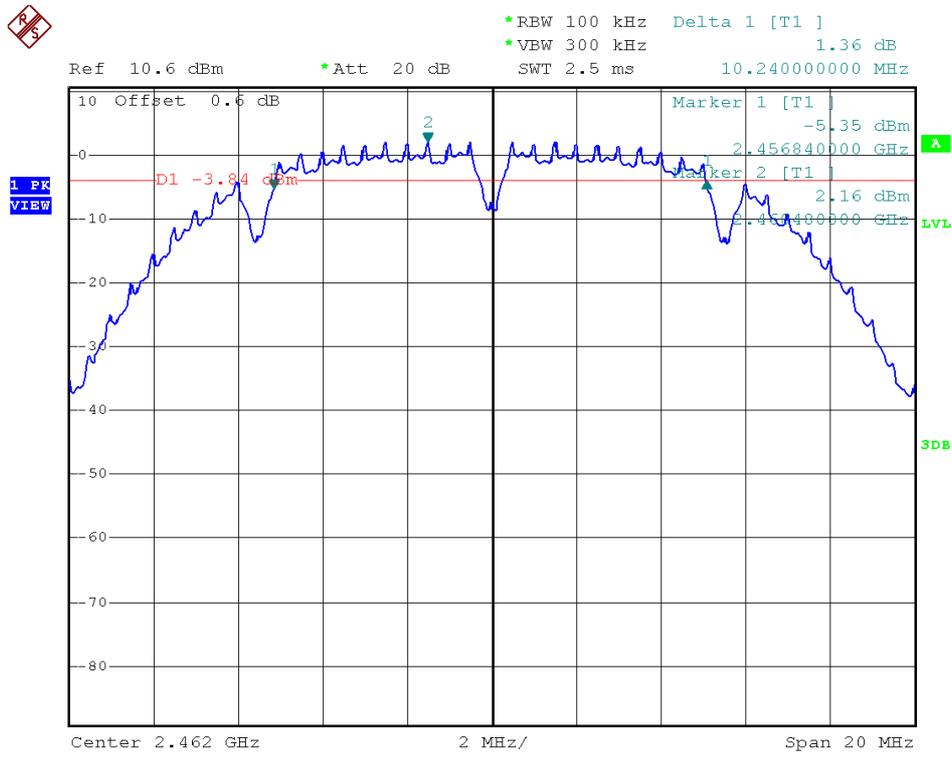
# INTERTEK TESTING SERVICES

802.11b



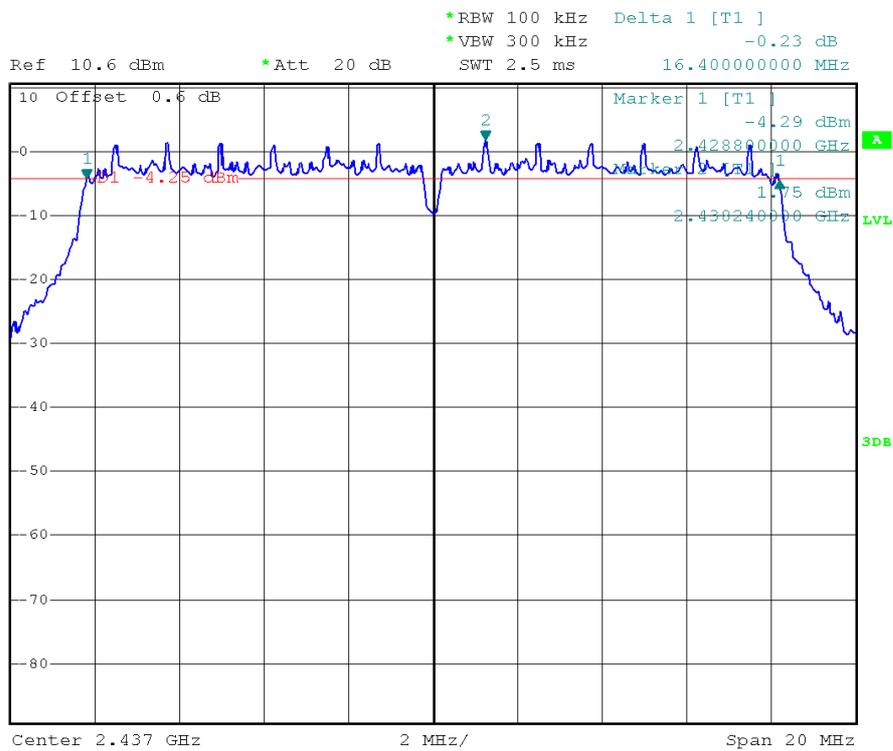
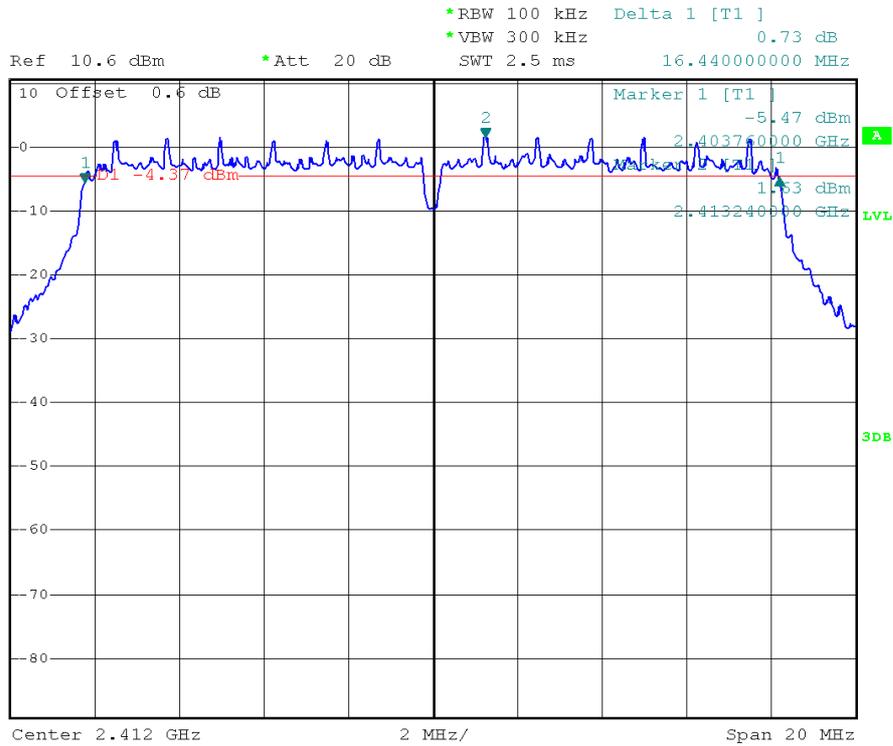
TRF no.: FCC 15C\_TX\_b  
 FCC ID: QIS-WS329  
 Report No.: 130410015SZN-002

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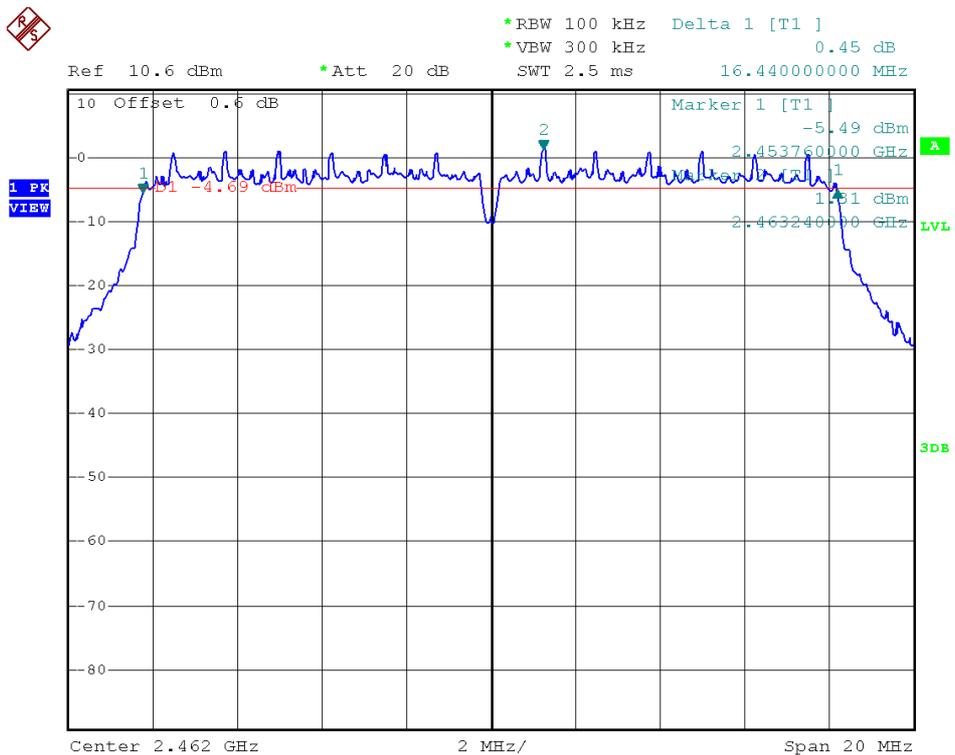
# INTERTEK TESTING SERVICES

802.11g



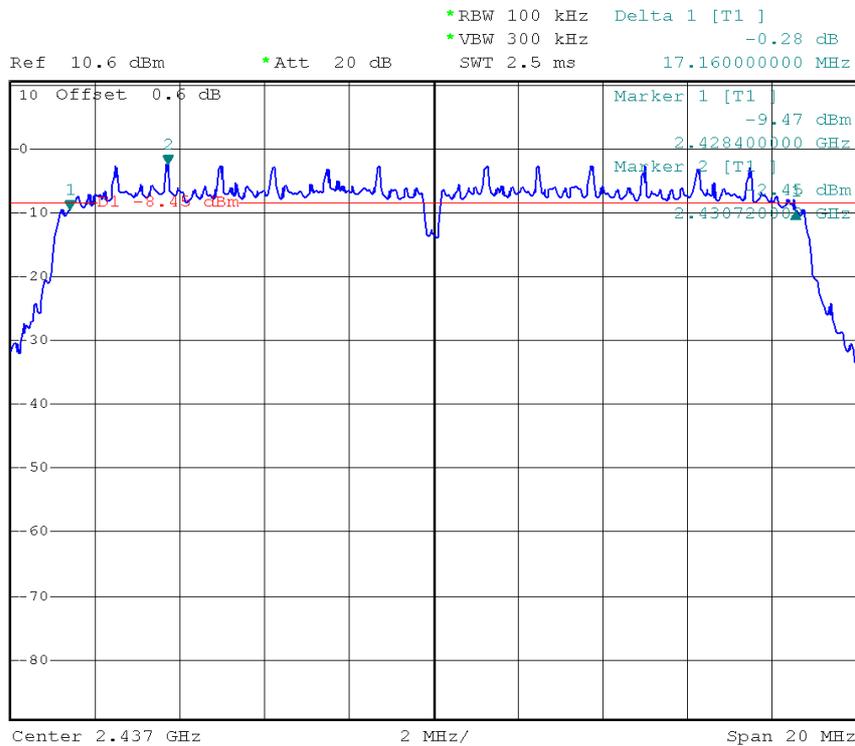
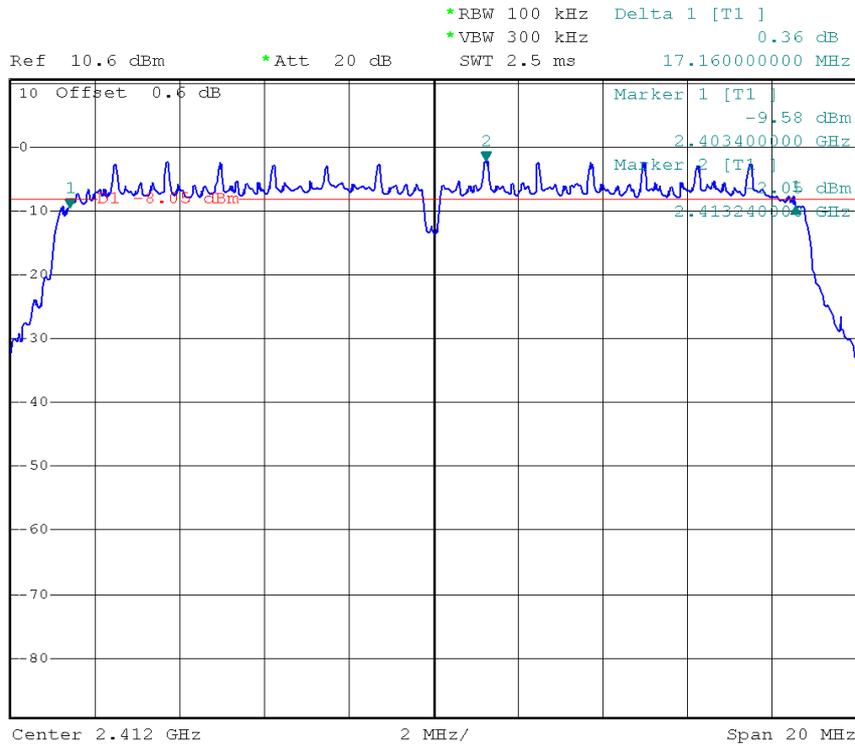
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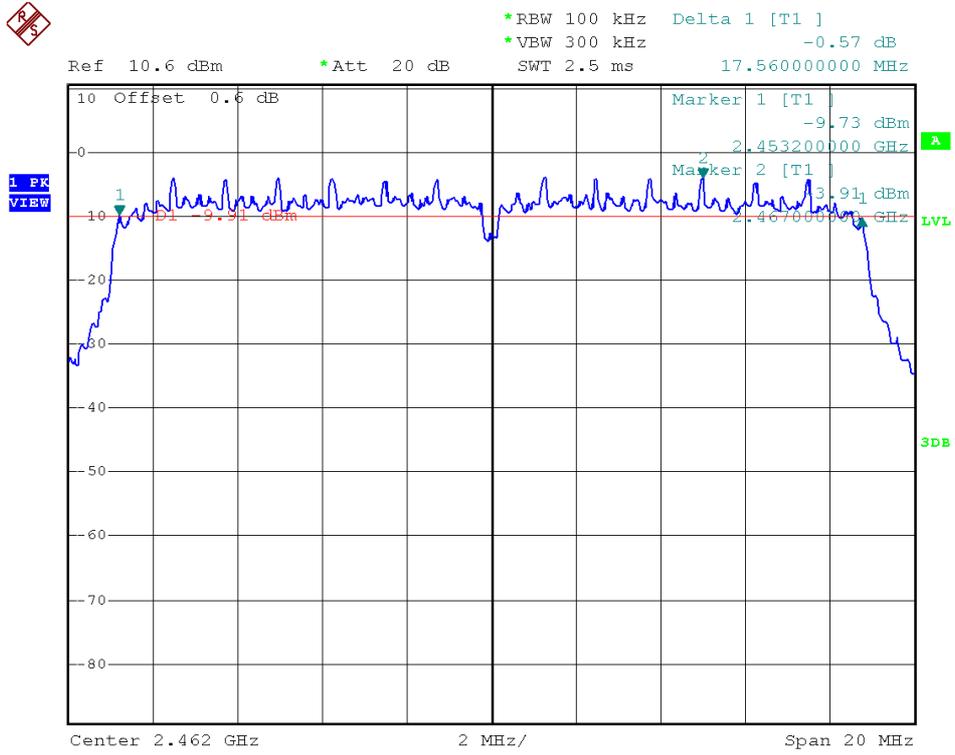


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## 802.11n (HT-20) MIMO

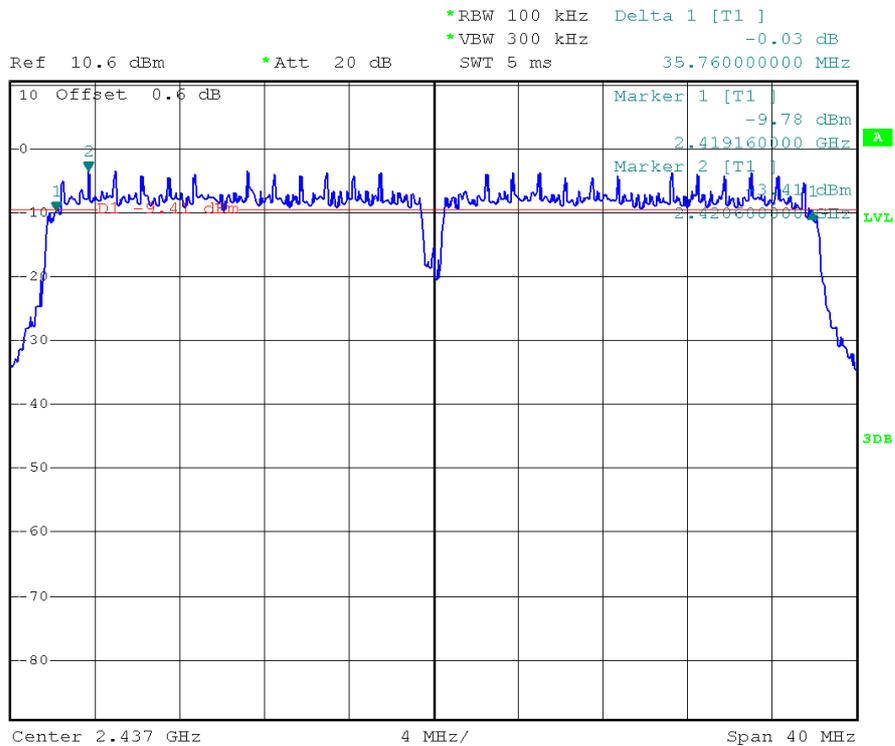
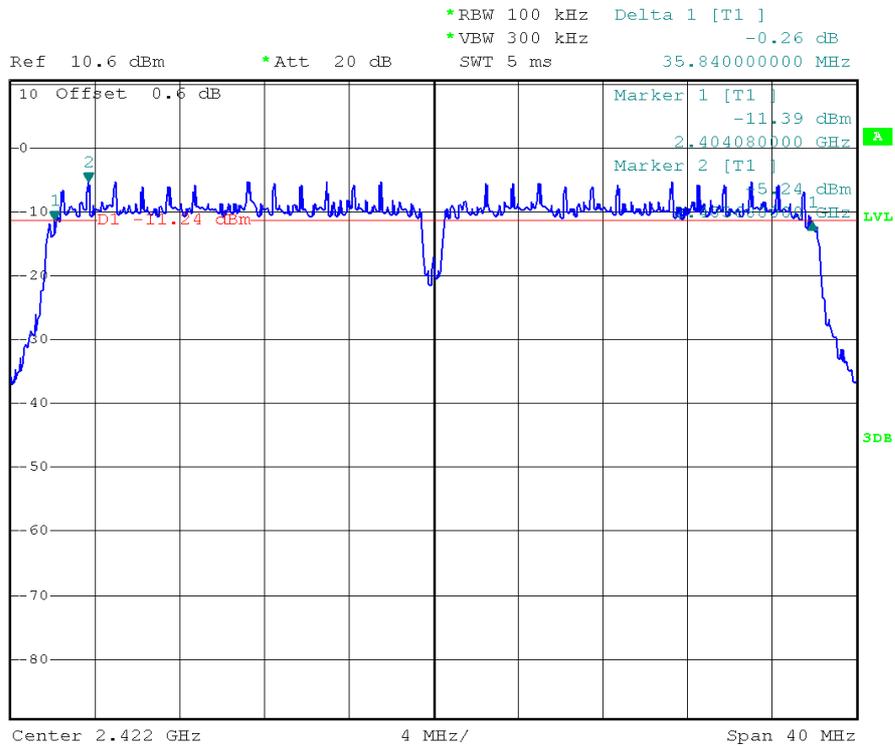


# INTERTEK TESTING SERVICES



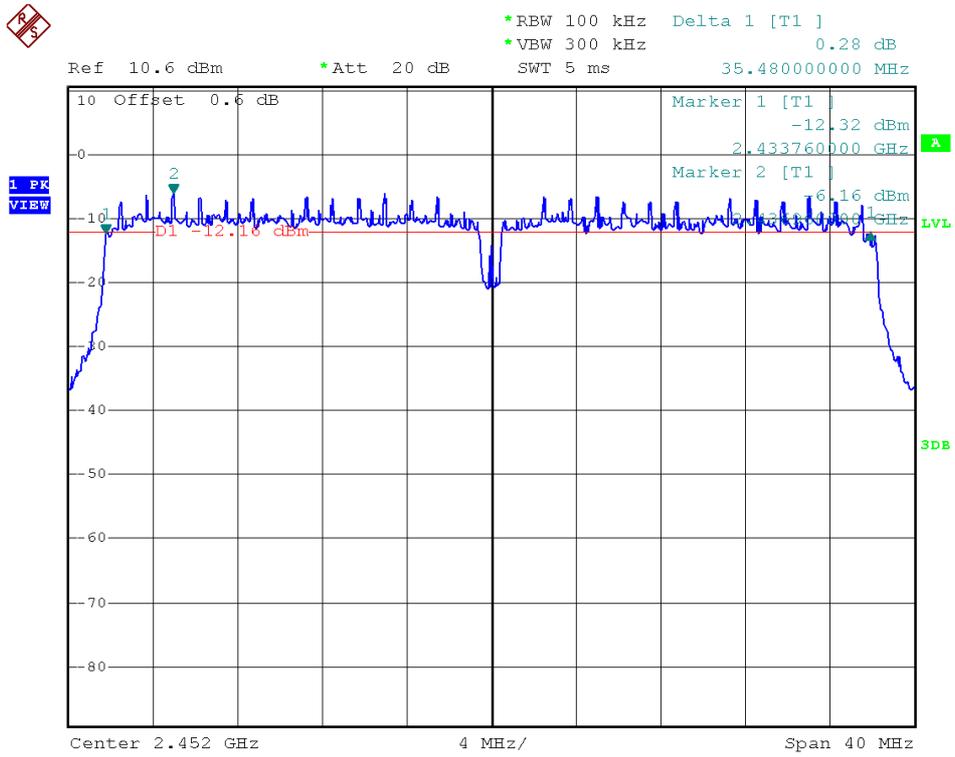
# INTERTEK TESTING SERVICES

## 802.11n (HT-40) MIMO



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES



## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.  
Model: WS329

Date of Test: 23 April 2013

### 4.3 Maximum Power Density Reading, FCC Rule 15.247(e) :

The Measurement Procedure PKPSD was set according to the FCC KDB 558074.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

For MIMO system, both the antenna ports is checked, the worst case power density is calculated from the method of Measure by adding  $10\log(2)$  according KDB662911.

Limit: The Power Density does not exceed 8dBm/ 3 kHz.

IEEE 802.11b (BPSK, 1Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	2.80
2437	2.43
2462	1.85

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	1.77
2437	1.65
2462	1.19

IEEE 802.11n 20M MIMO (16QAM, 13Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz(Antenna 0+ Antenna 1)
2412	1.89
2437	-0.02
2462	0.15

## INTERTEK TESTING SERVICES

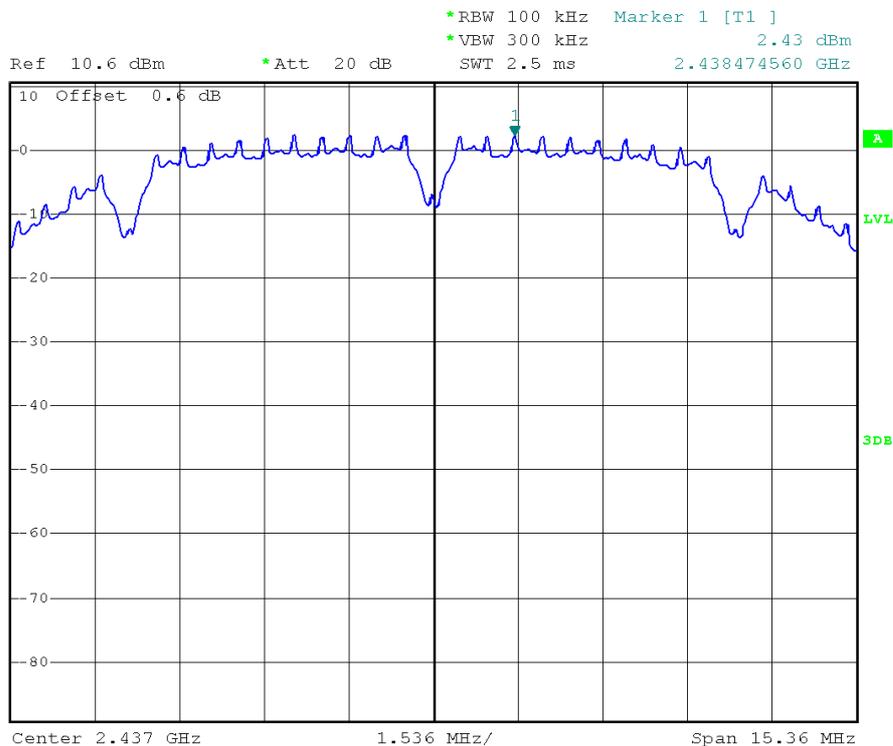
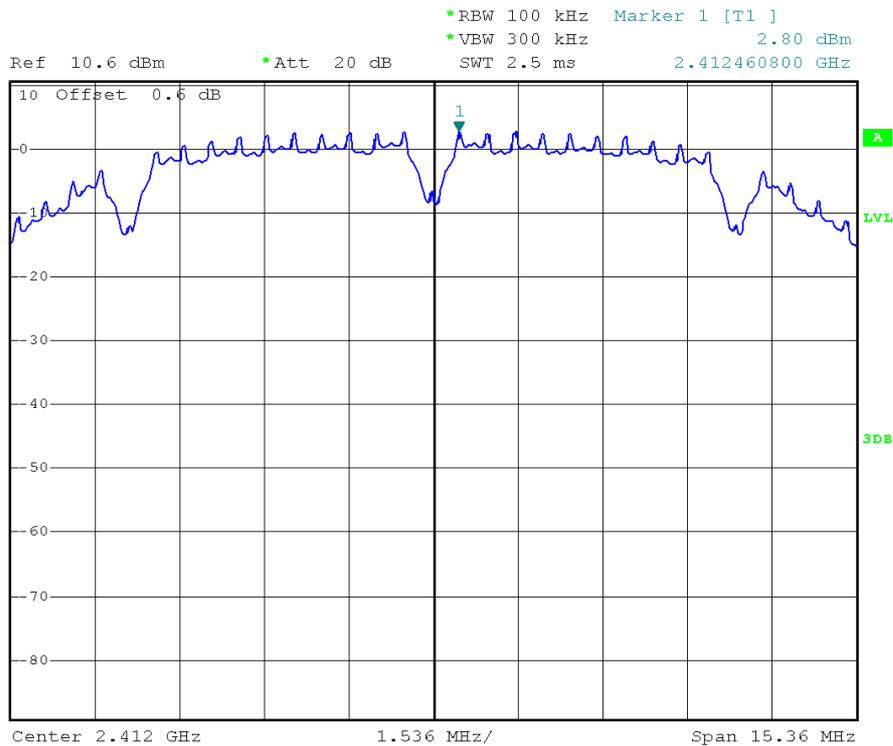
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IEEE 802.11n 40M MIMO (64QAM, 27Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz (Antenna 0+ Antenna 1)
2422	1.19
2437	1.47
2452	1.42

The test plots are attached as below.

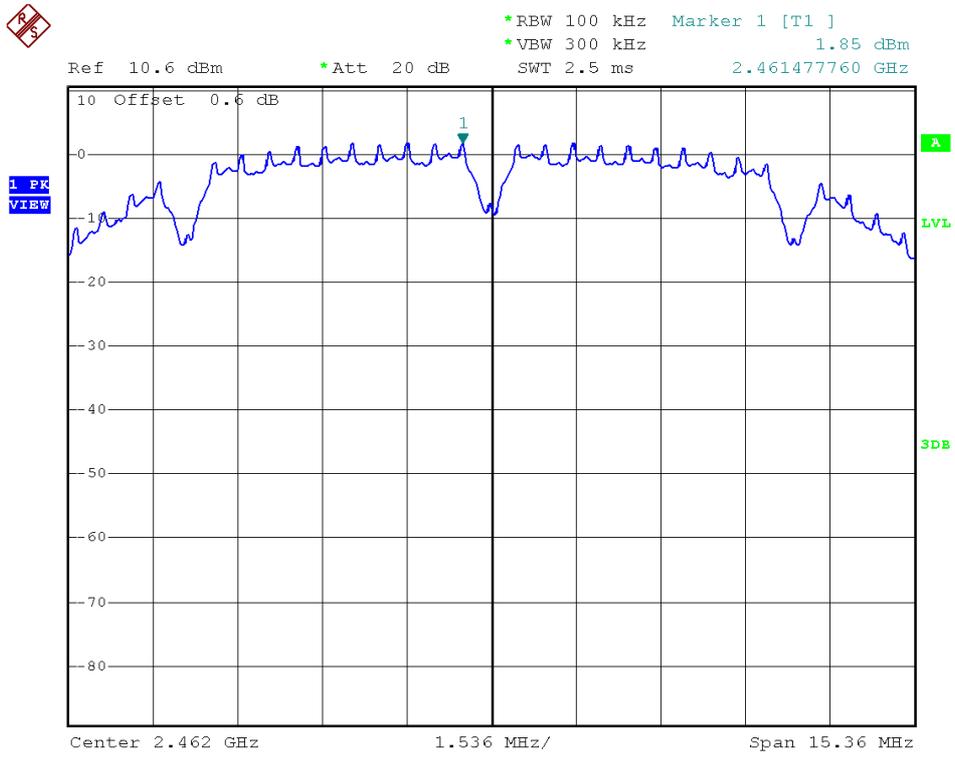
# INTERTEK TESTING SERVICES

802.11b



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

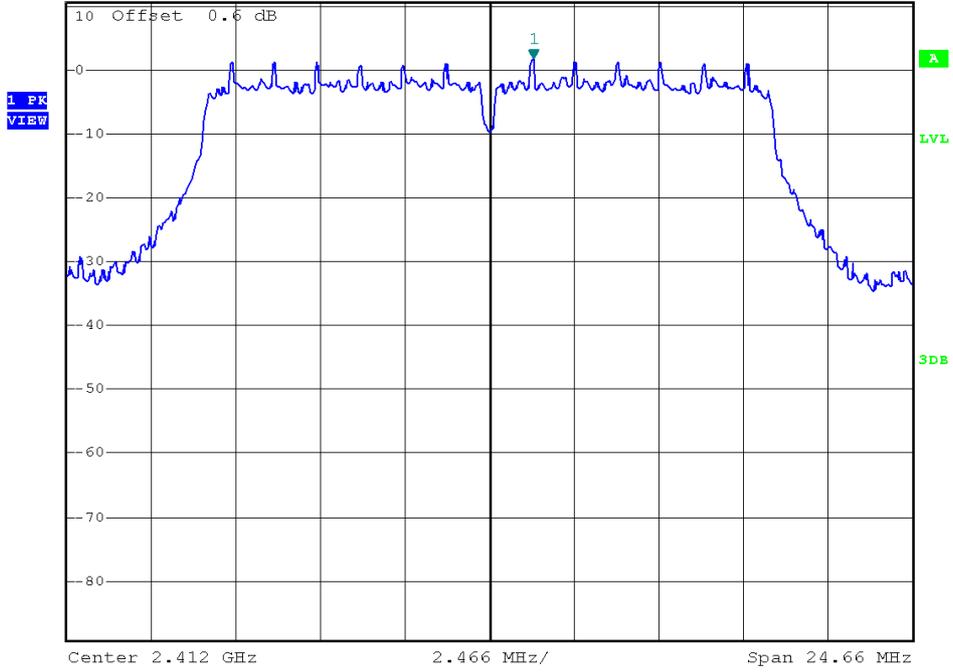


# INTERTEK TESTING SERVICES

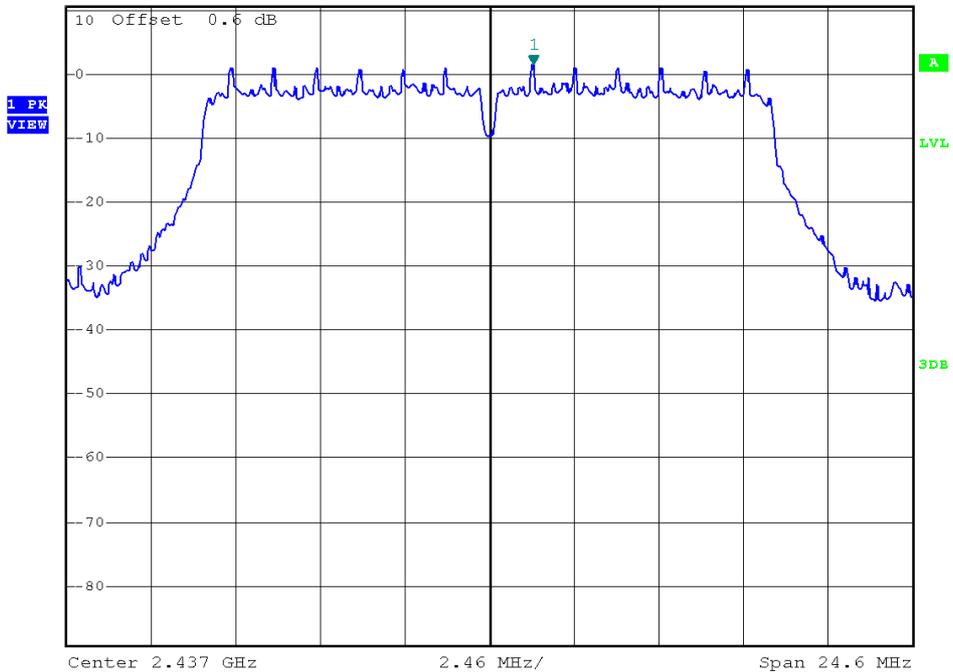
802.11g



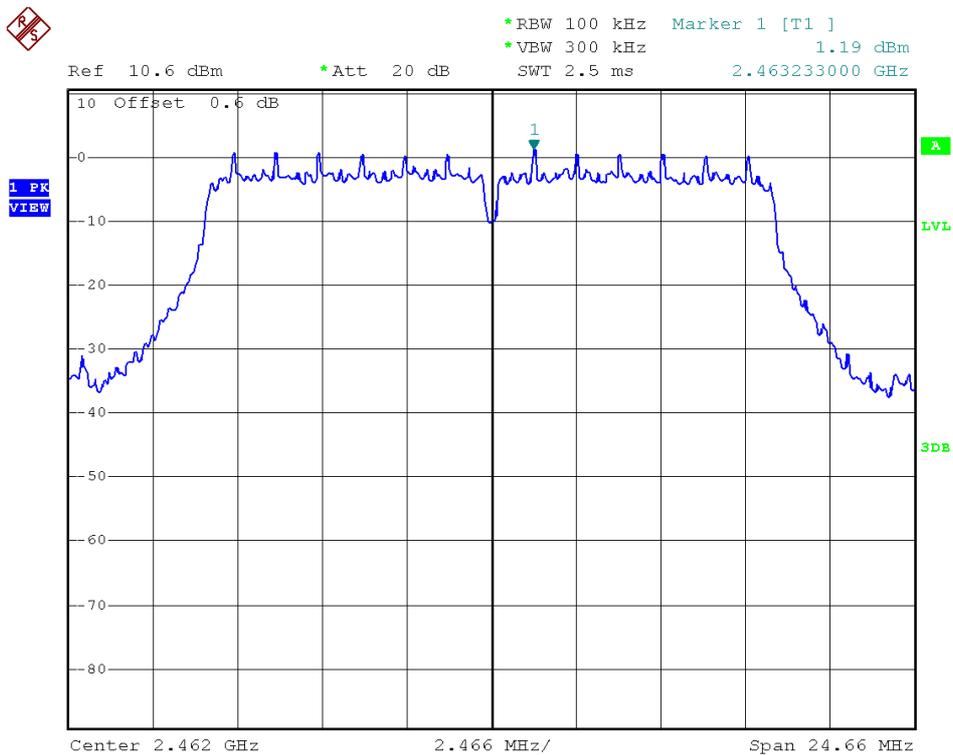
Ref 10.6 dBm \*Att 20 dB \*RBW 100 kHz Marker 1 [T1] \*VBW 300 kHz 1.77 dBm  
SWT 2.5 ms 2.413282320 GHz



Ref 10.6 dBm \*Att 20 dB \*RBW 100 kHz Marker 1 [T1] \*VBW 300 kHz 1.65 dBm  
SWT 2.5 ms 2.438279200 GHz

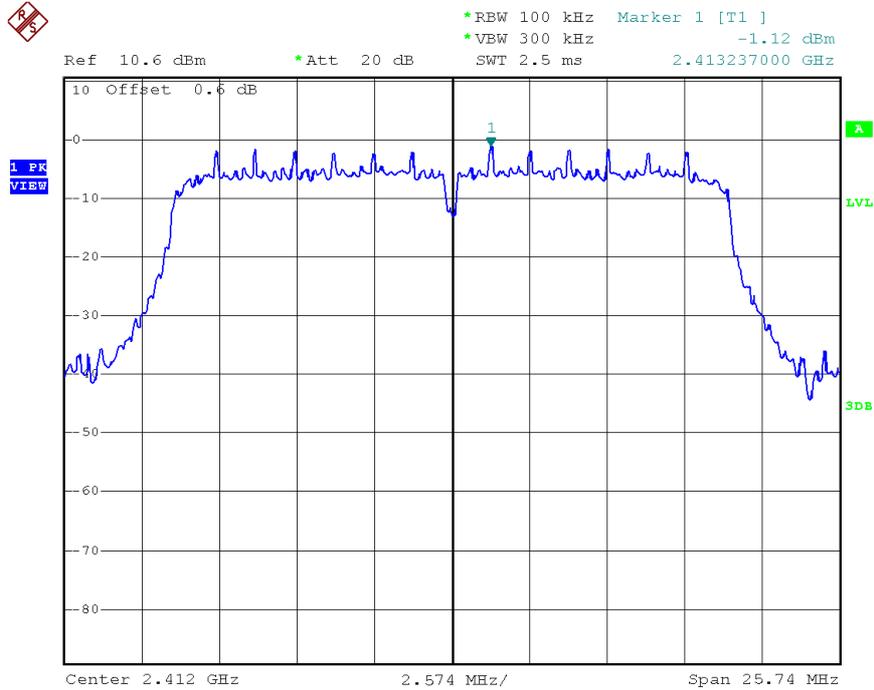


# INTERTEK TESTING SERVICES

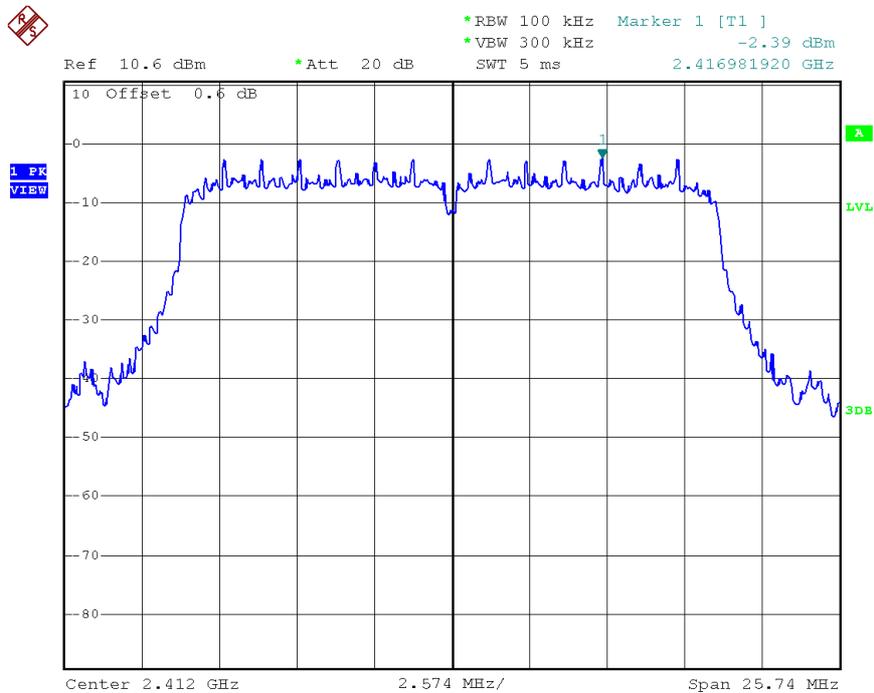


# INTERTEK TESTING SERVICES

802.11n (HT-20) MIMO  
Channel 01 ANT 0



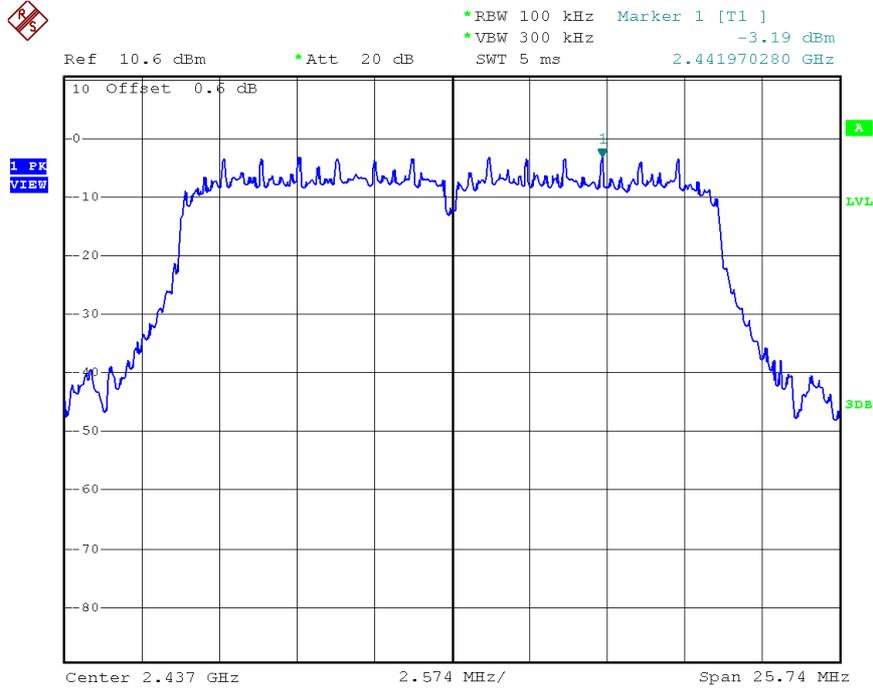
Channel 01 ANT 1



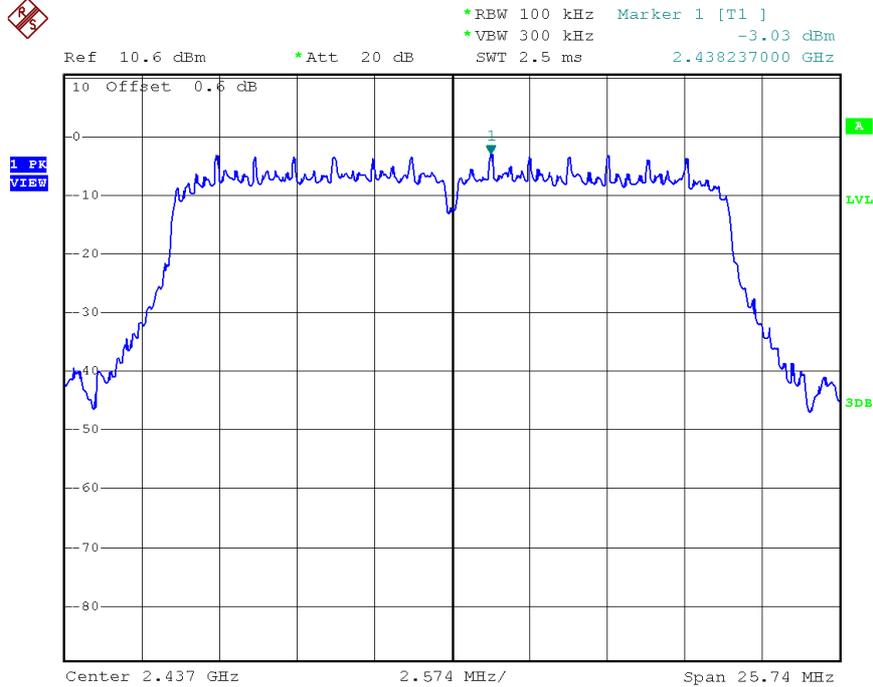
TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

## Channel 06 ANT 0

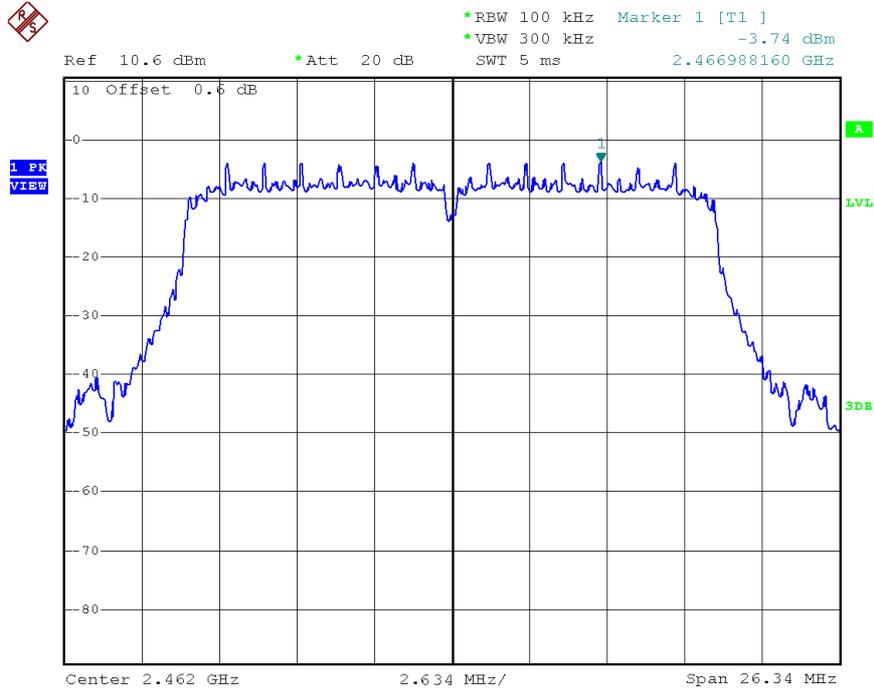


## Channel 06 ANT 1

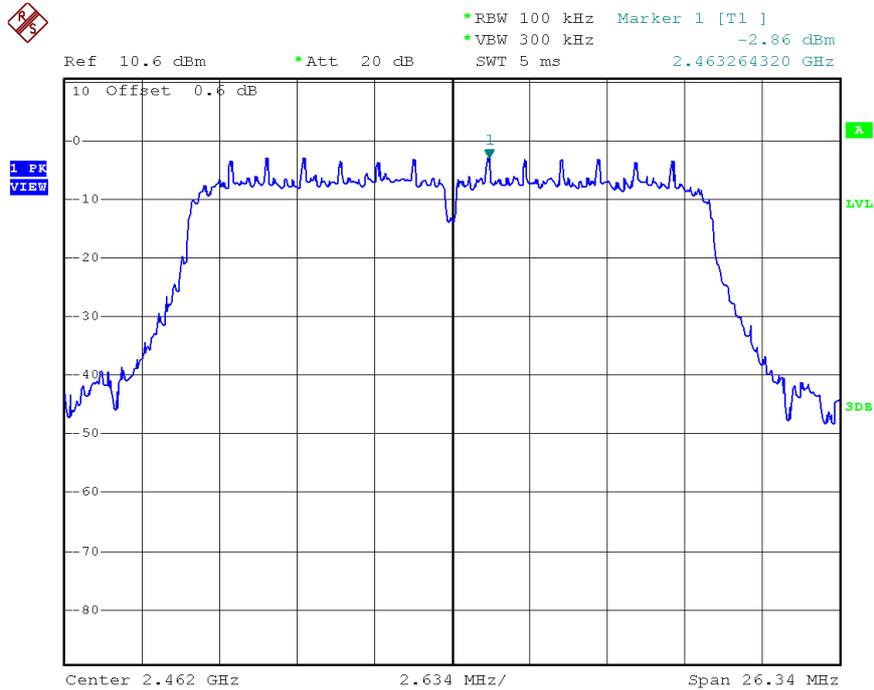


# INTERTEK TESTING SERVICES

## Channel 11 ANT 0

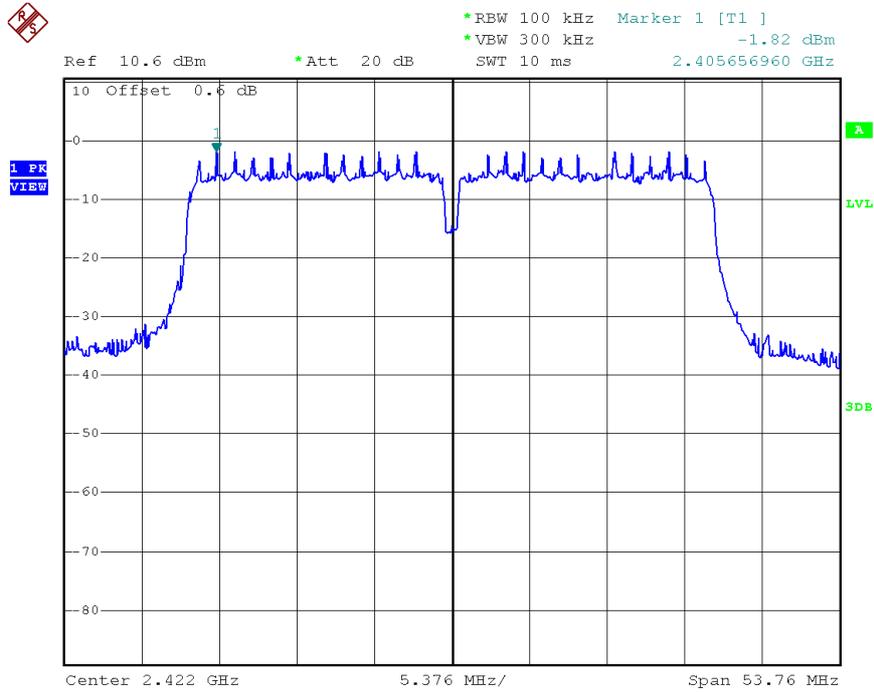


## Channel 11 ANT 1

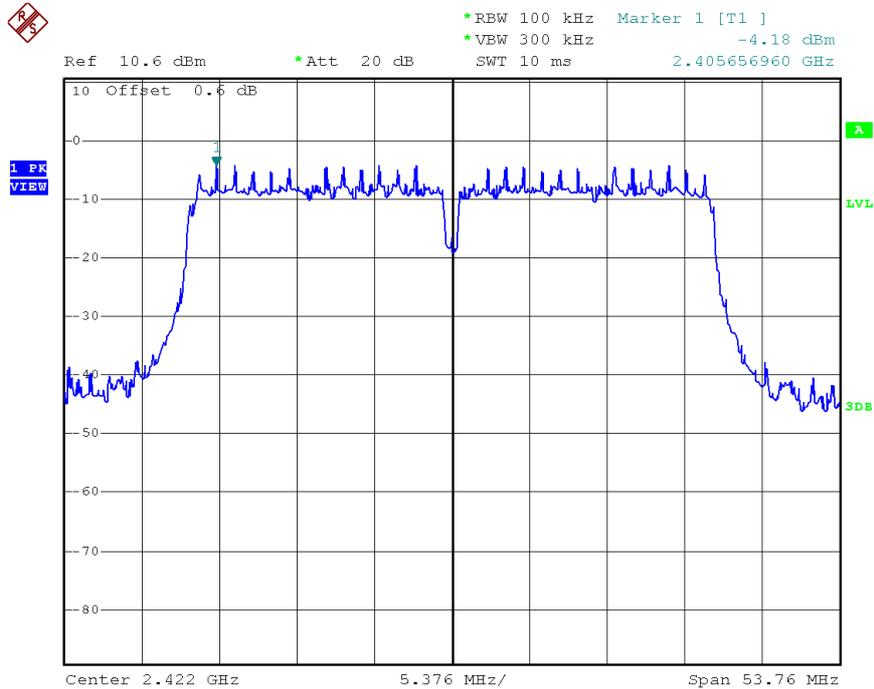


# INTERTEK TESTING SERVICES

802.11n (HT-40) MIMO  
Channel 03 ANT 0



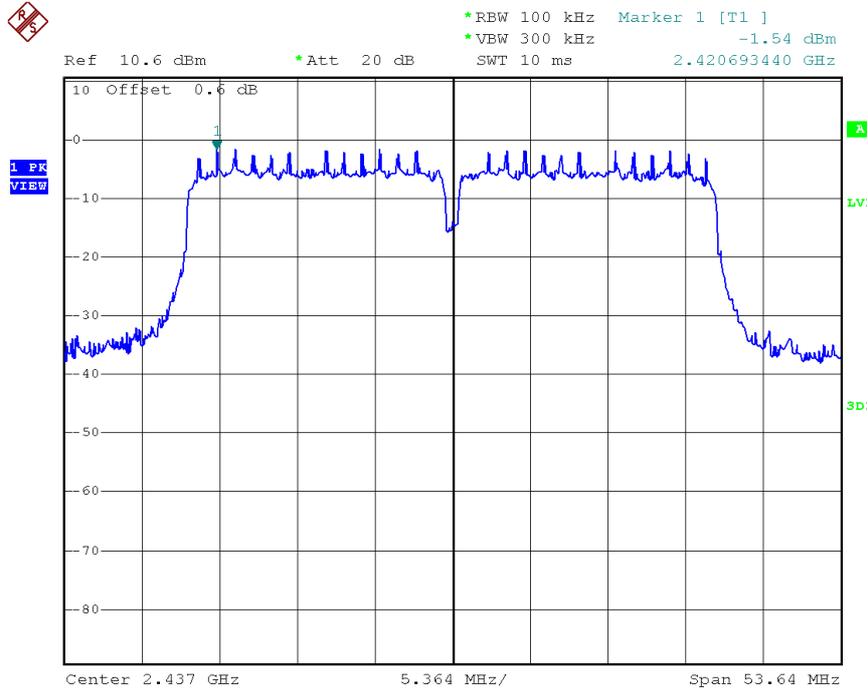
Channel 03 ANT 1



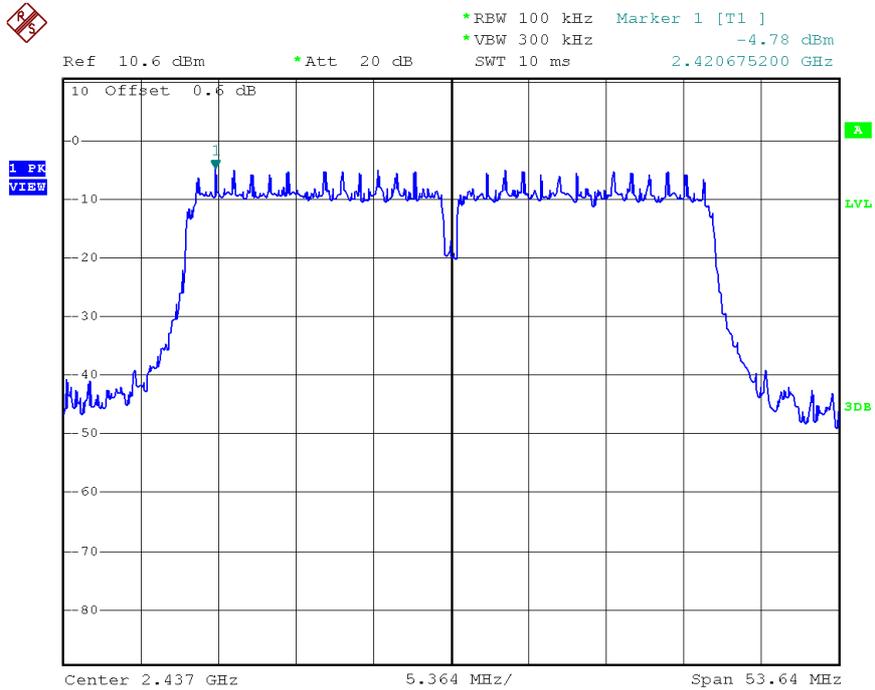
TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

## Channel 06 ANT 0

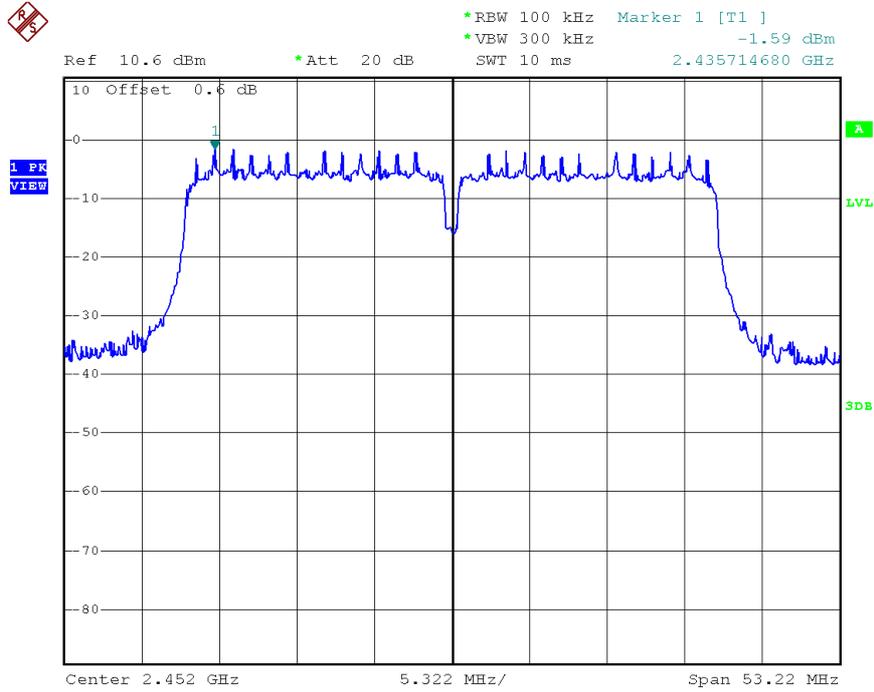


## Channel 06 ANT 1

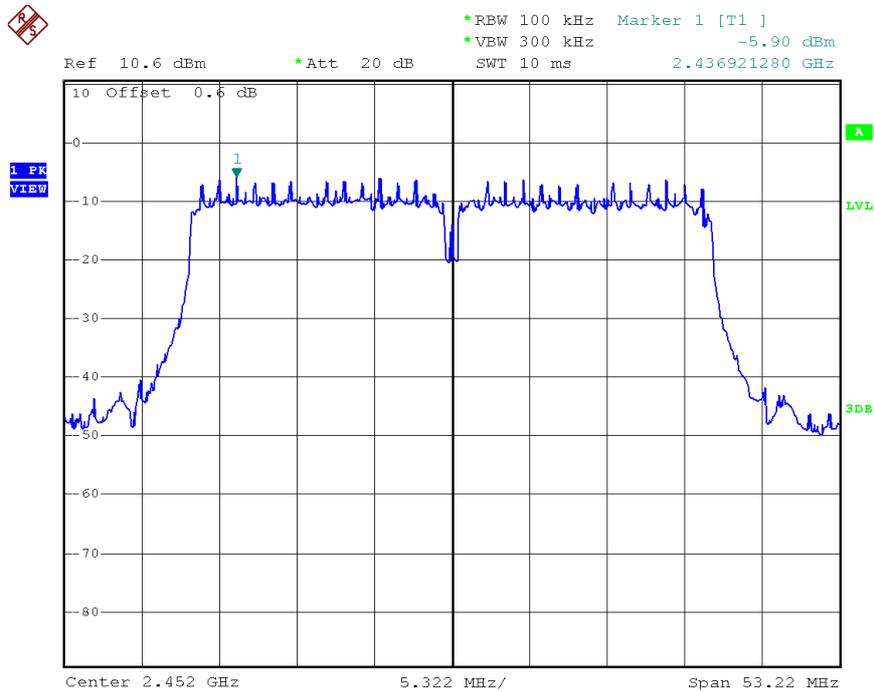


# INTERTEK TESTING SERVICES

## Channel 09 ANT 0



## Channel 09 ANT 1



## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.  
Model: WS329

Date of Test: 23 April 2013

#### 4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation. The Measurement Procedure was set according to the FCC KDB 558074.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

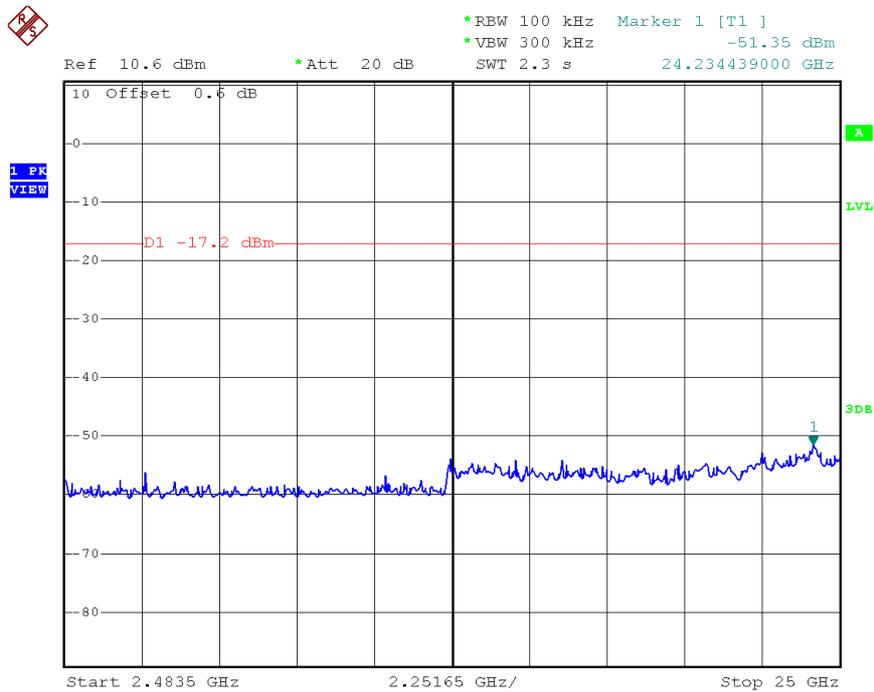
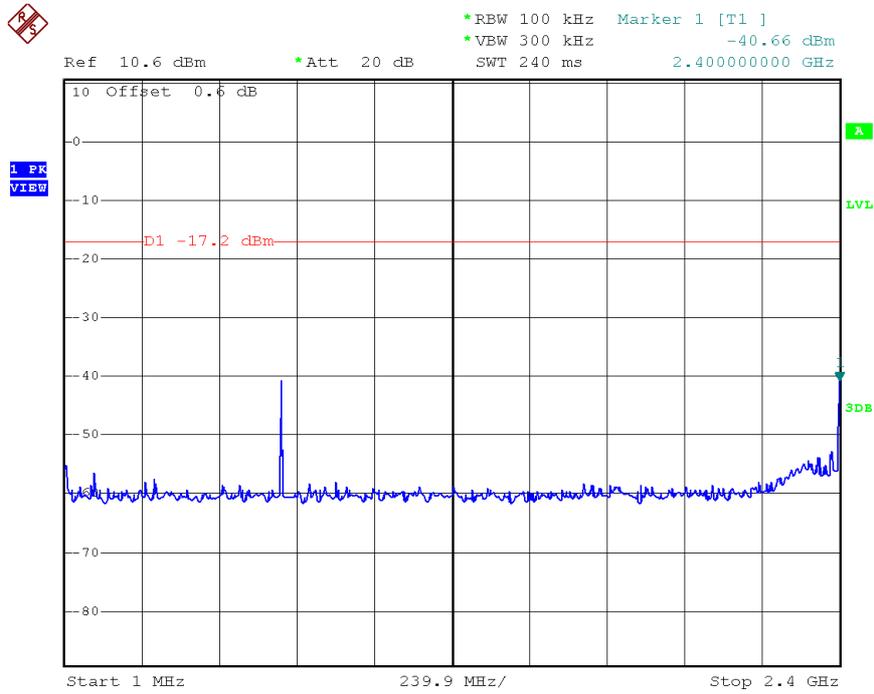
Refer to the attached test plot for out of band conducted emissions data with rate of 1Mbps for 802.11b, 6Mbps for 802.11g, 13Mbps for 802.11n HT20 MIMO and 27Mbps for 802.11n HT40 MIMO. For MIMO system, both the antenna ports is checked and the worst case are shown, The worst case Out of Band Conducted Emissions is derived from the method of Measure according KDB662911.

The test plots showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

# INTERTEK TESTING SERVICES

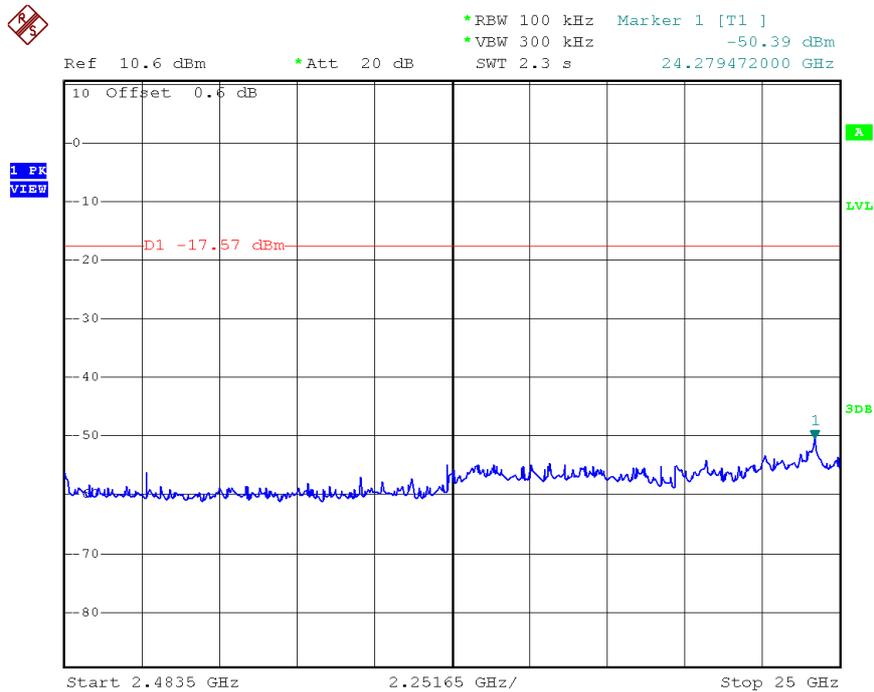
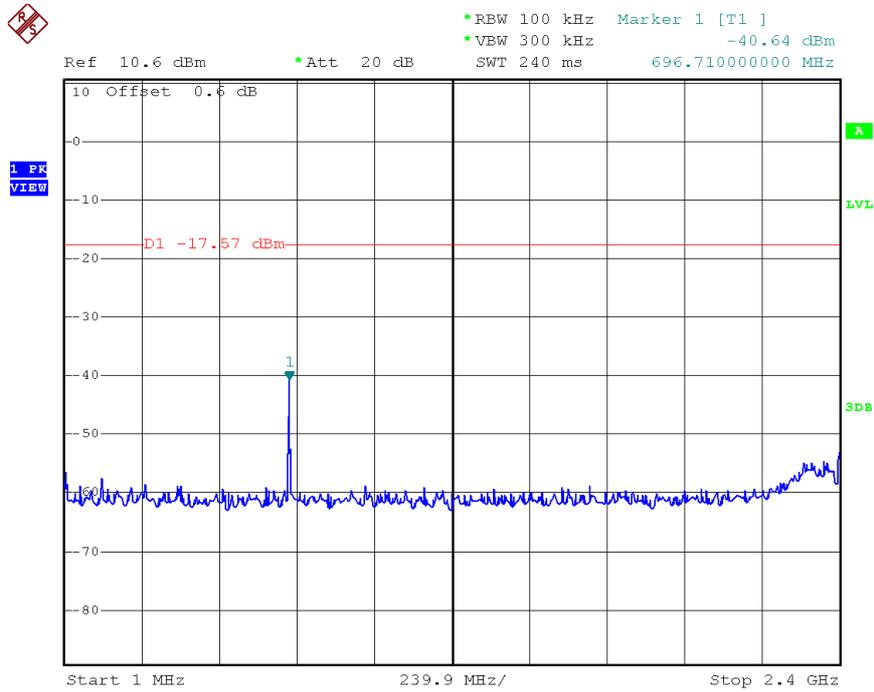
802.11b  
Channel 1 (2412MHz) Reference Level: 2.80dBm



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

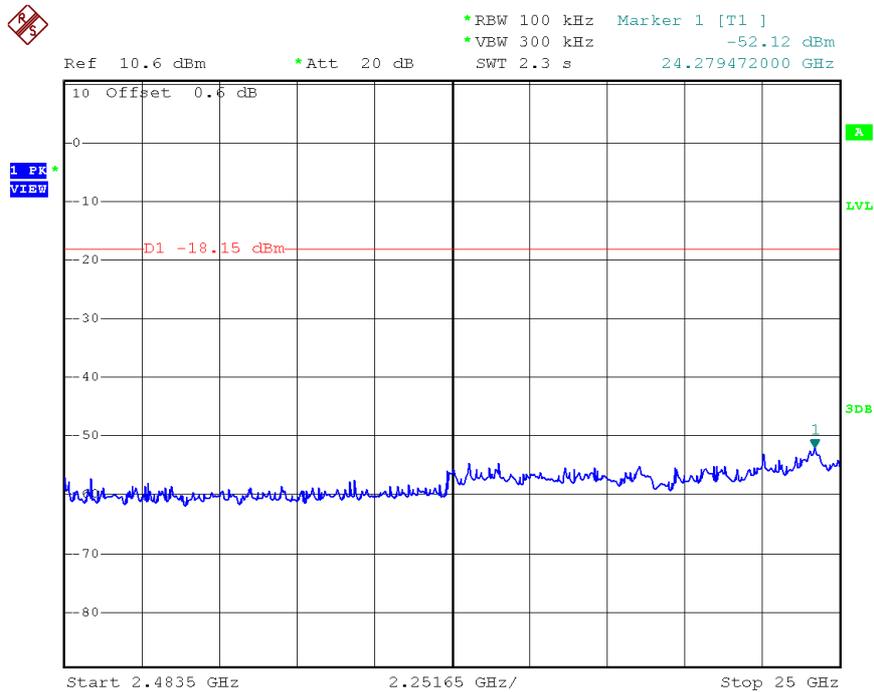
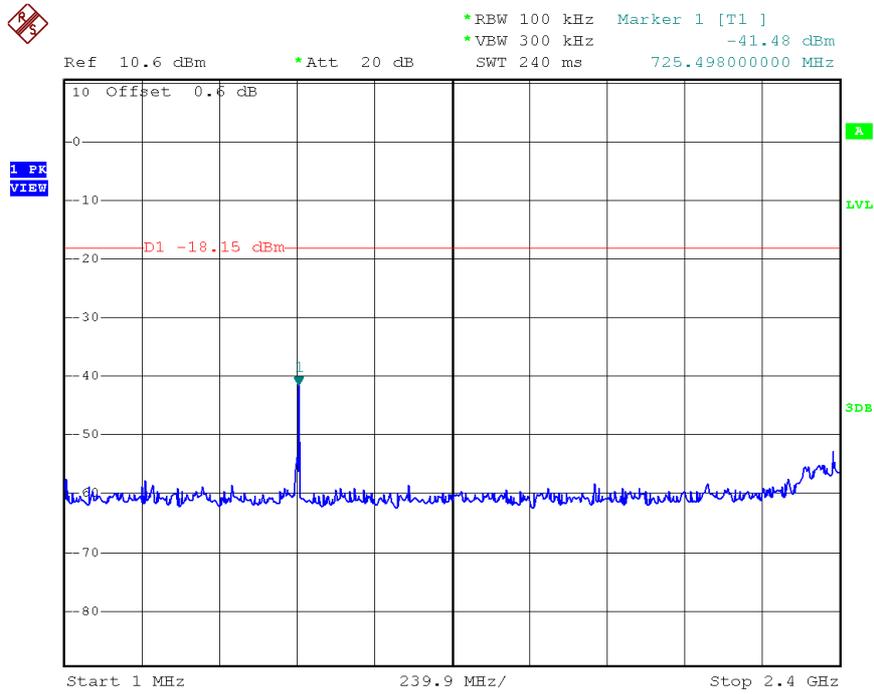
Channel 6 (2437MHz) Reference Level: 2.43dBm



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

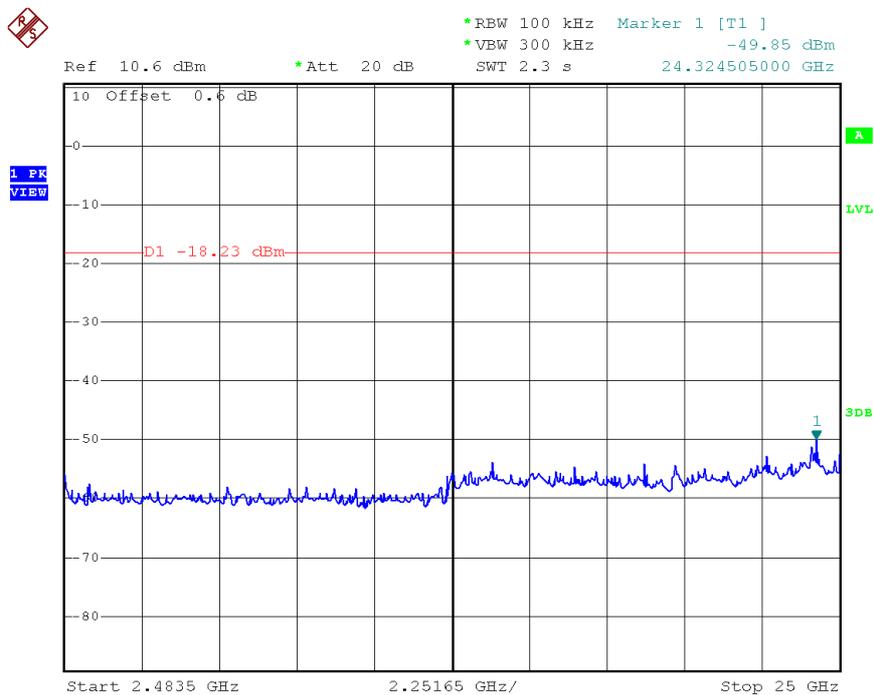
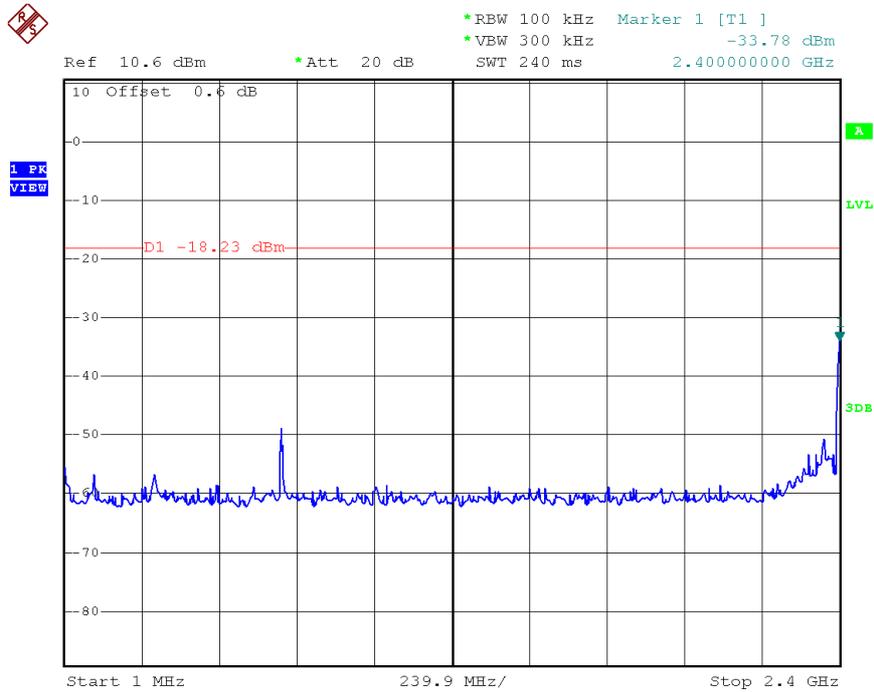
Channel 11 (2462MHz) Reference Level: 1.85dBm



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

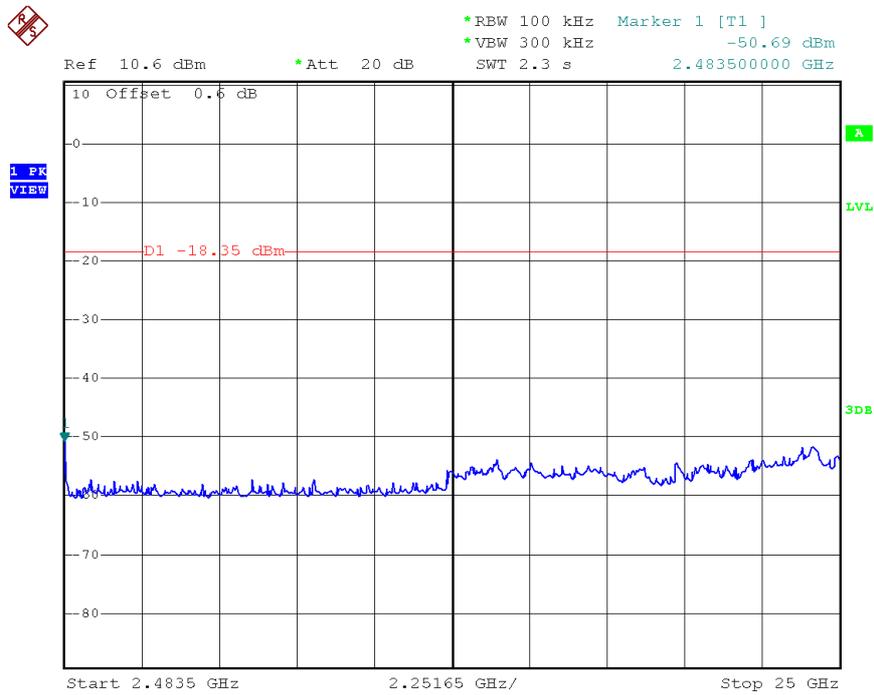
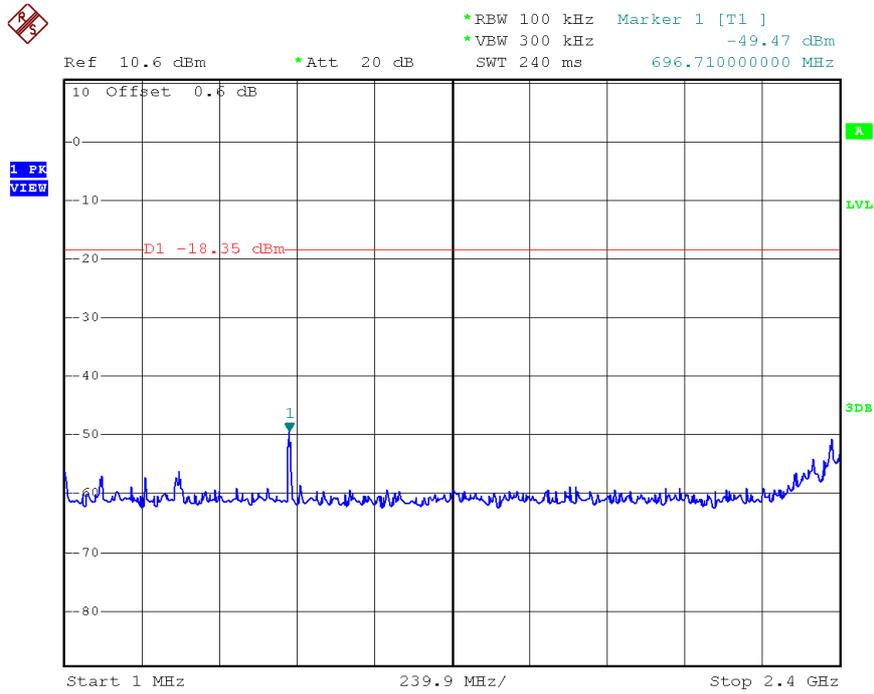
802.11g  
Channel 1 (2412MHz) Reference Level: 1.77dBm



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

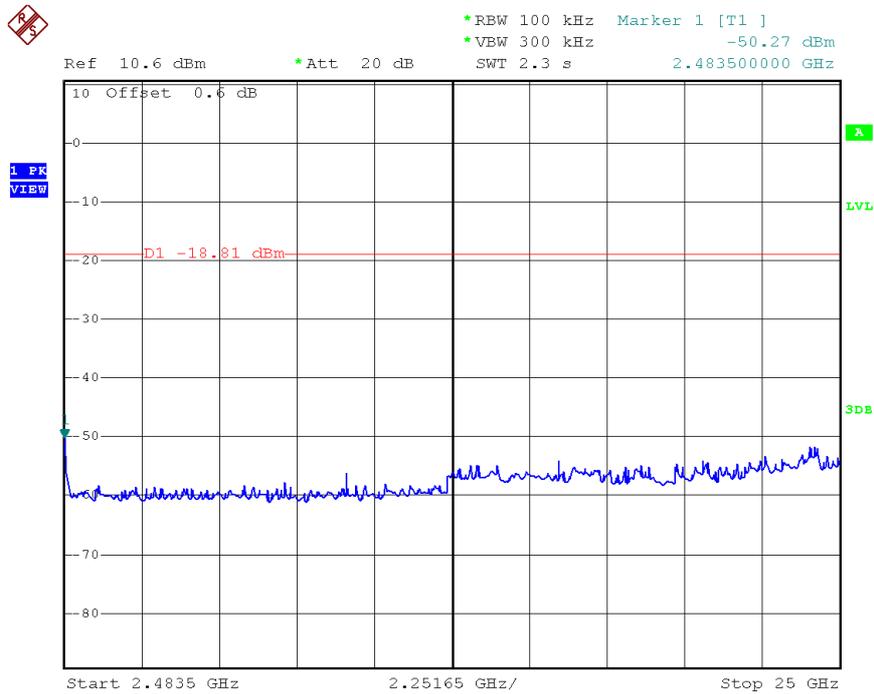
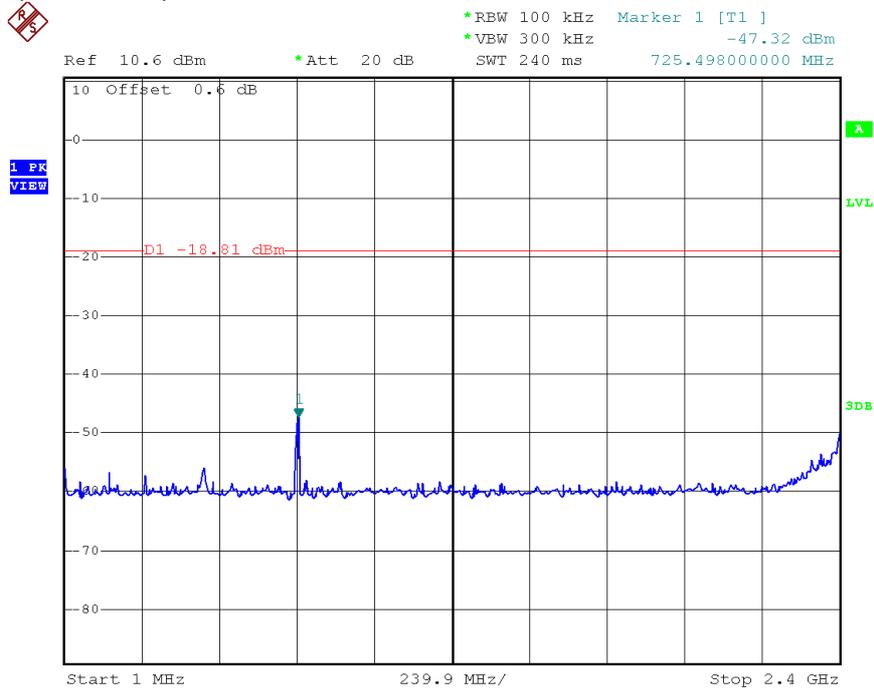
Channel 6 (2437MHz) Reference Level: 1.65dBm



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: 1.19dBm

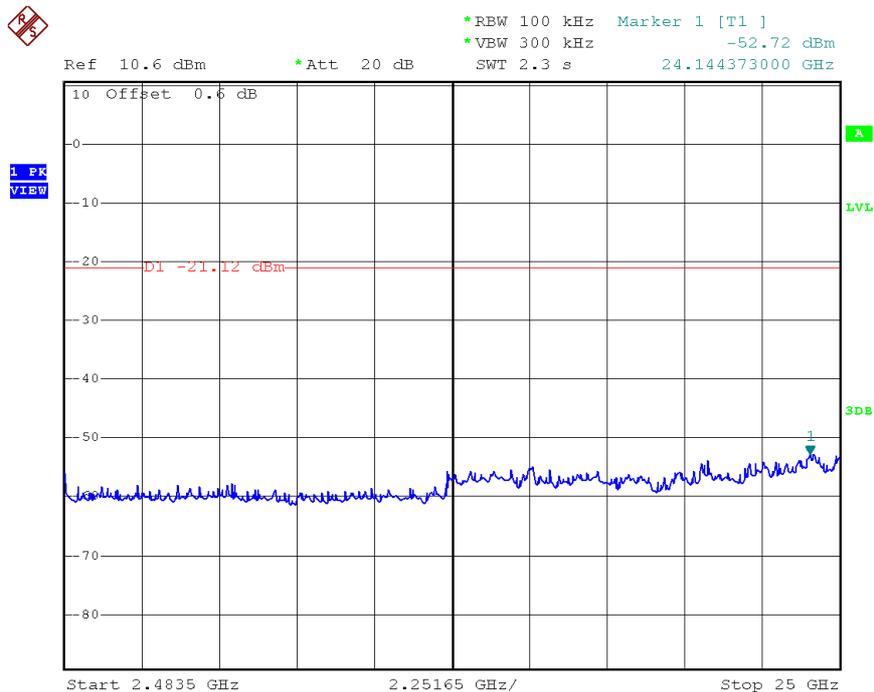
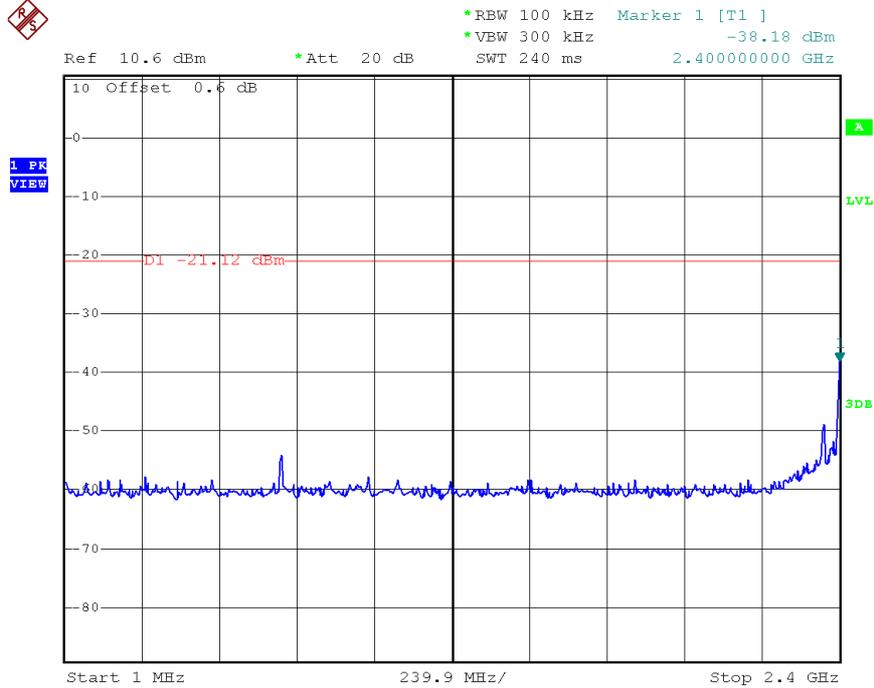


TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

802.11n (HT-20) MIMO

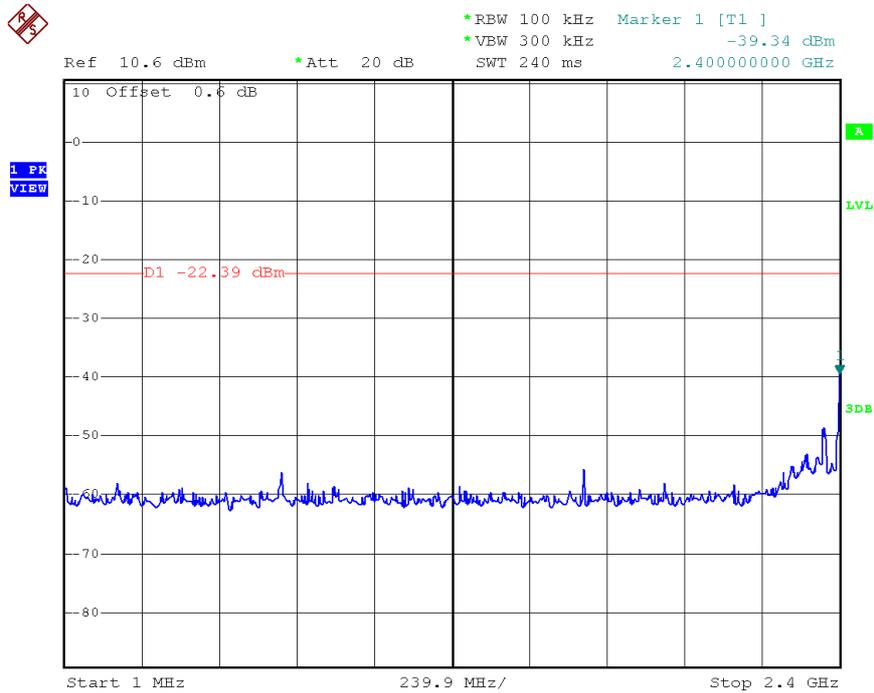
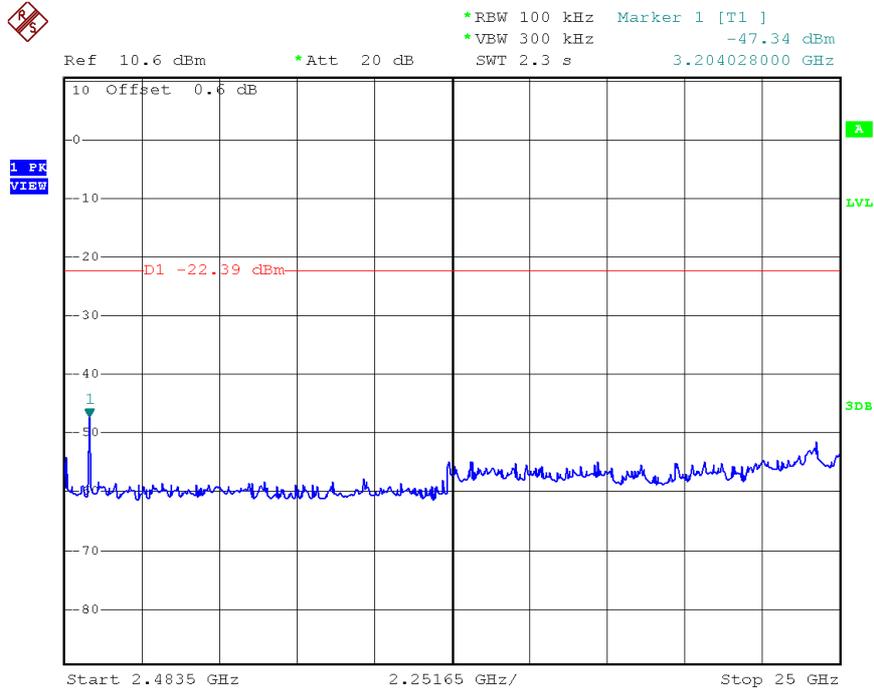
Channel 1 (2412MHz) Reference Level: -1.12dBm ANT 0



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

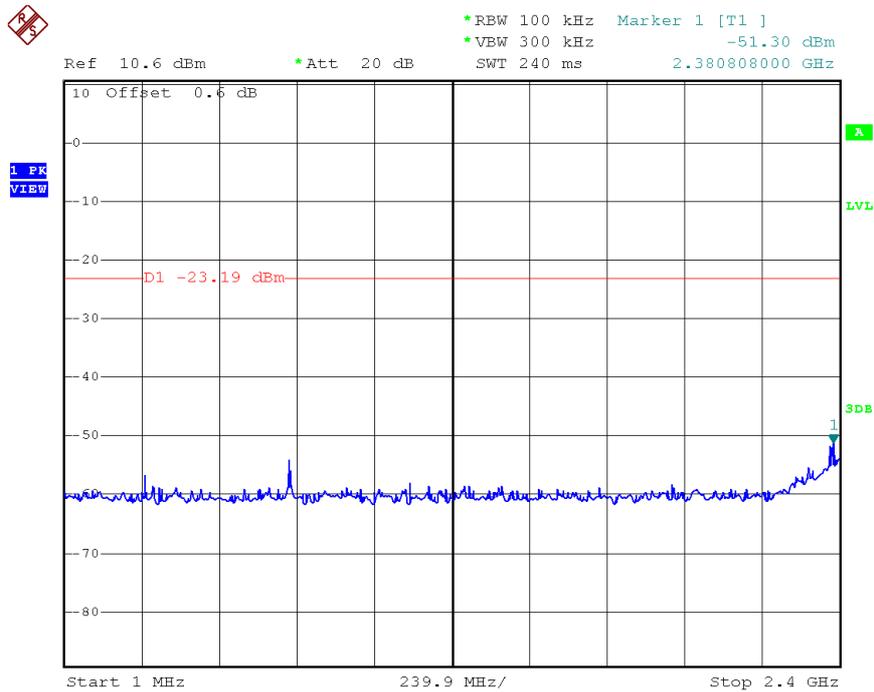
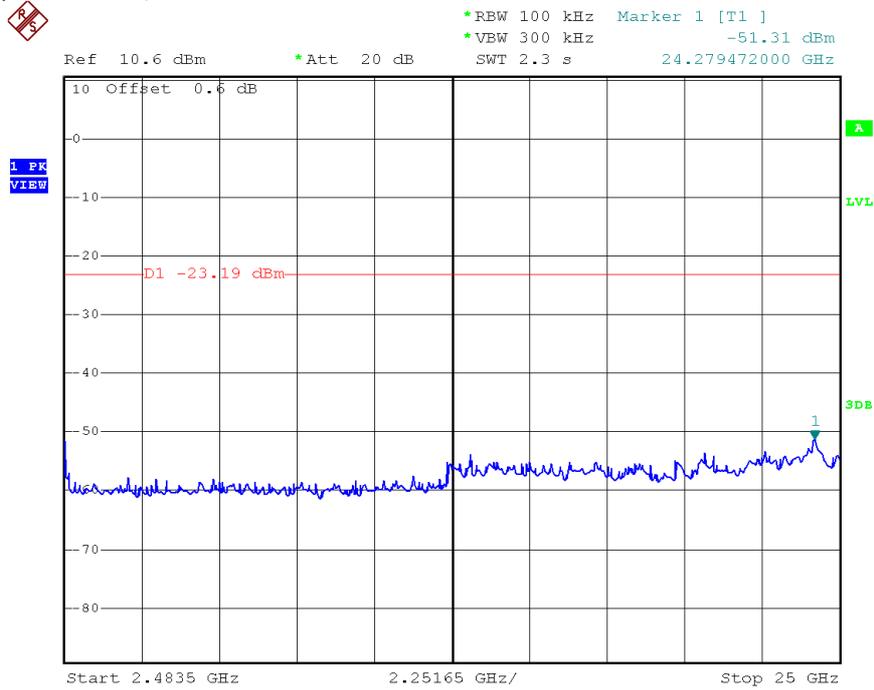
Channel 1 (2412MHz) Reference Level: -2.39dBm ANT 1



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

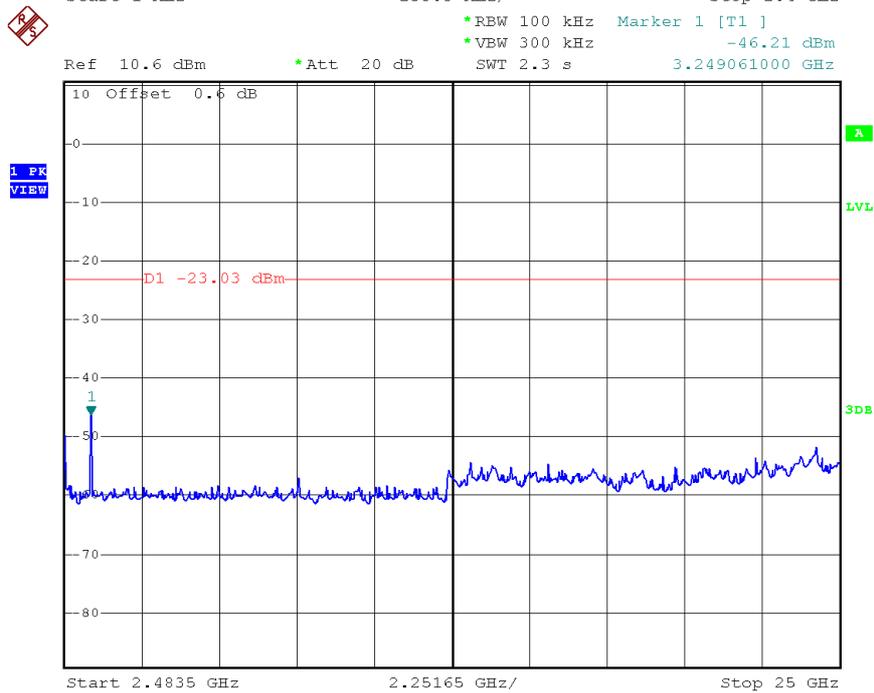
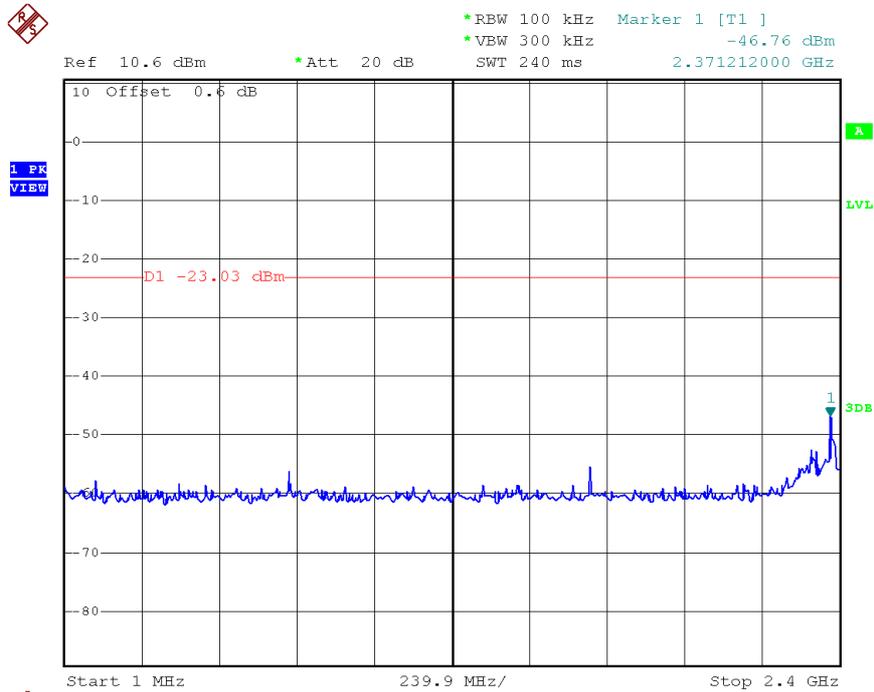
Channel 6 (2437MHz) Reference Level: -3.19dBm ANT 0



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

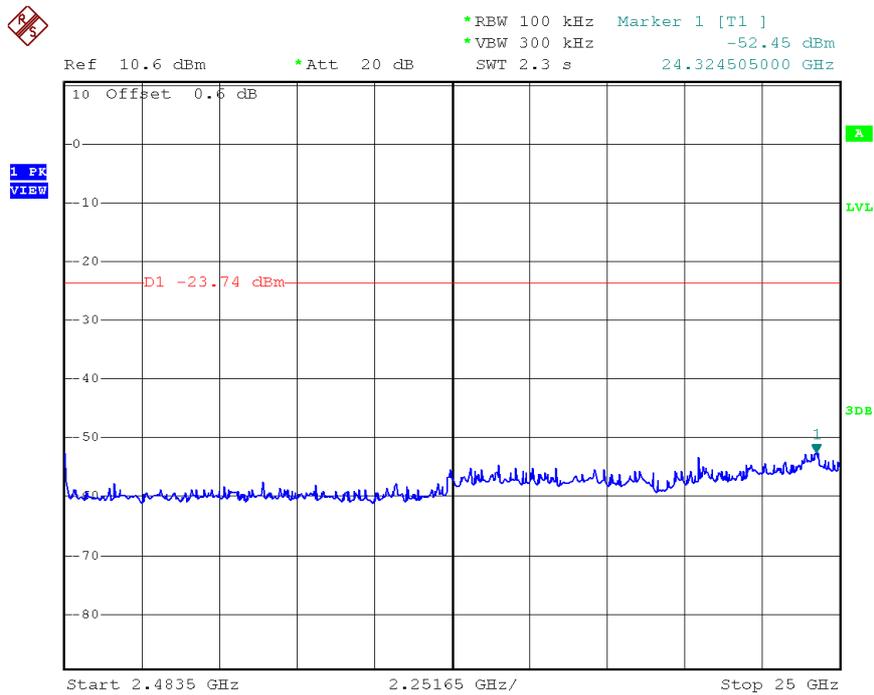
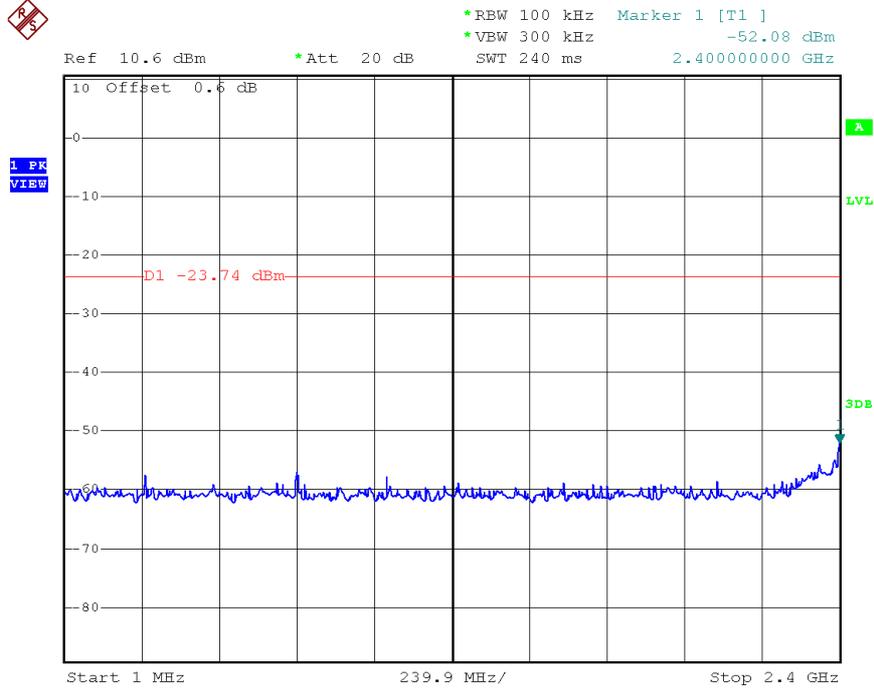
Channel 6 (2437MHz) Reference Level: -3.03dBm ANT 1



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

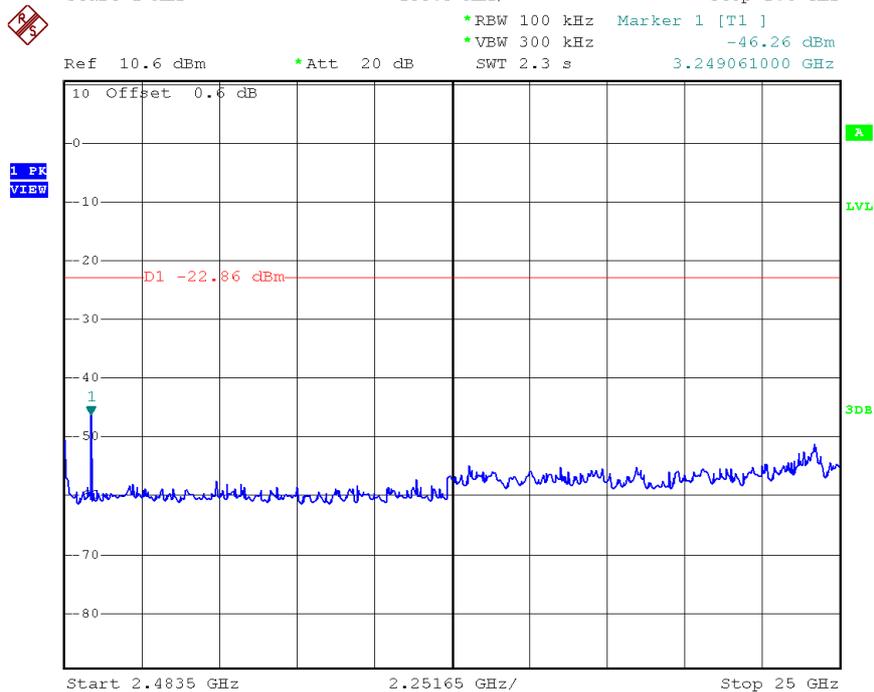
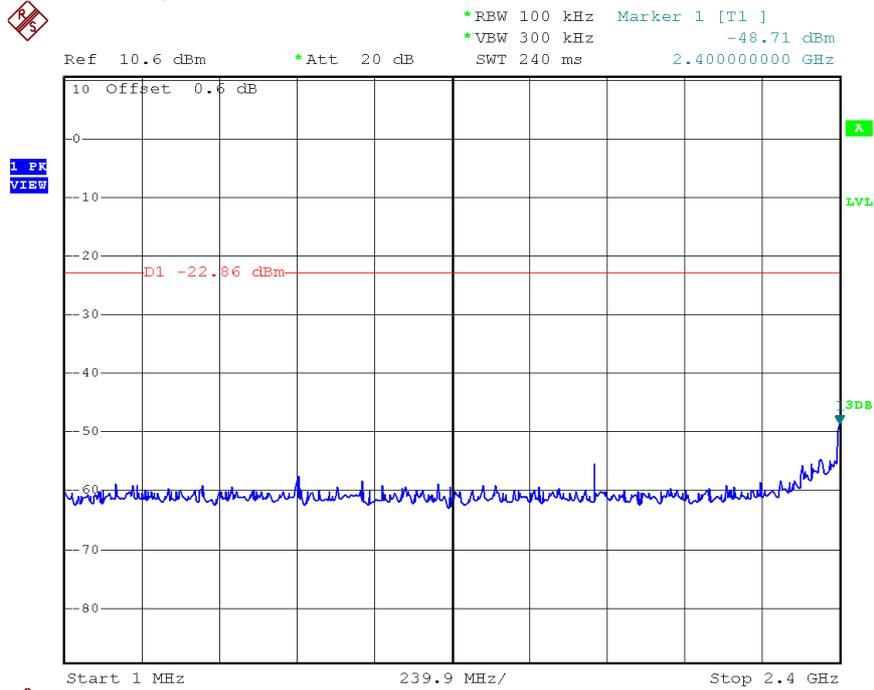
Channel 11 (2462MHz) Reference Level: -3.74dBm ANT 0



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

Channel 11 (2462MHz) Reference Level: -2.86dBm ANT 1

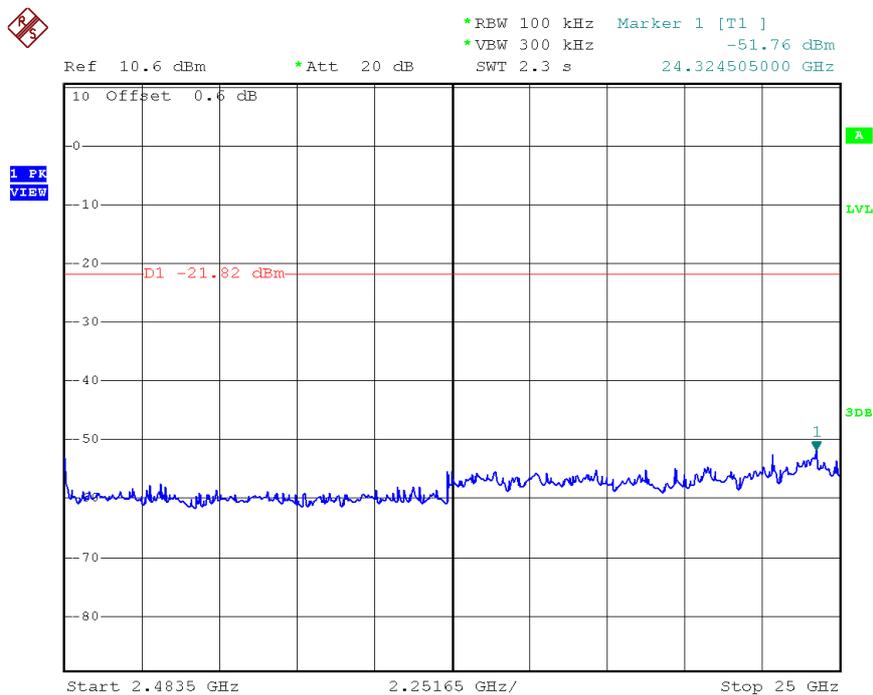
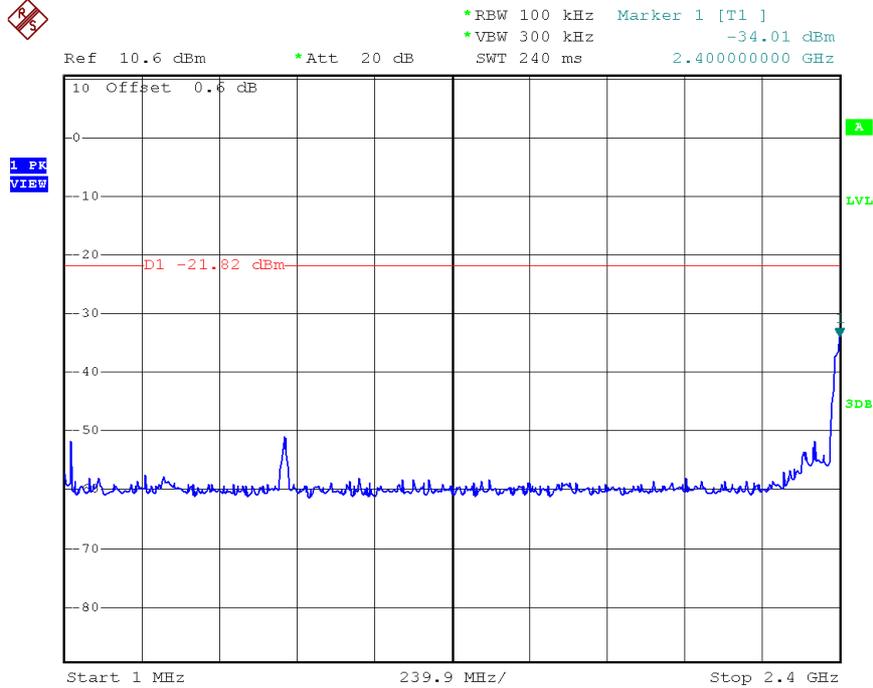


TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

802.11n (HT-40) MIMO

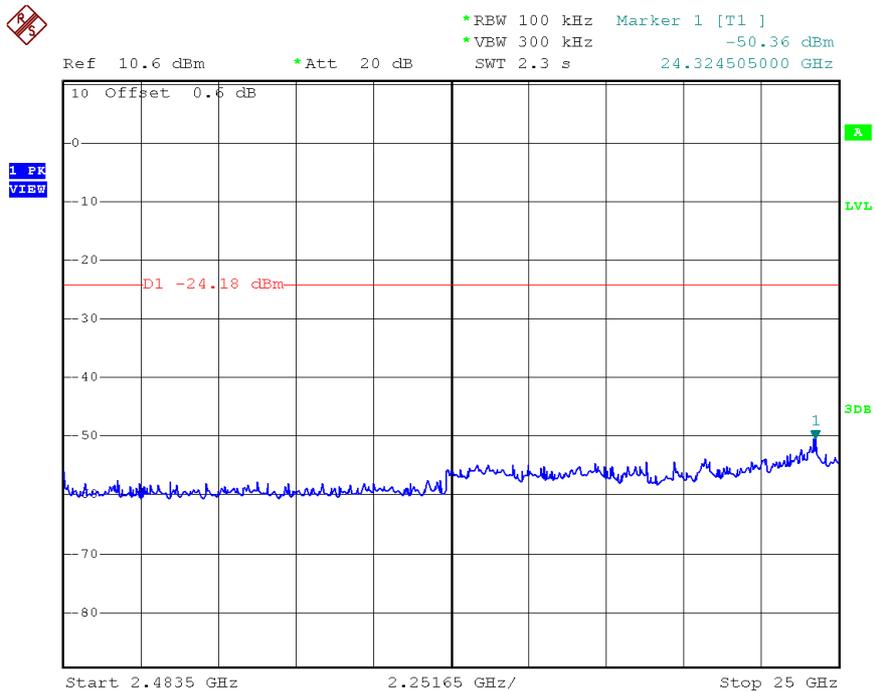
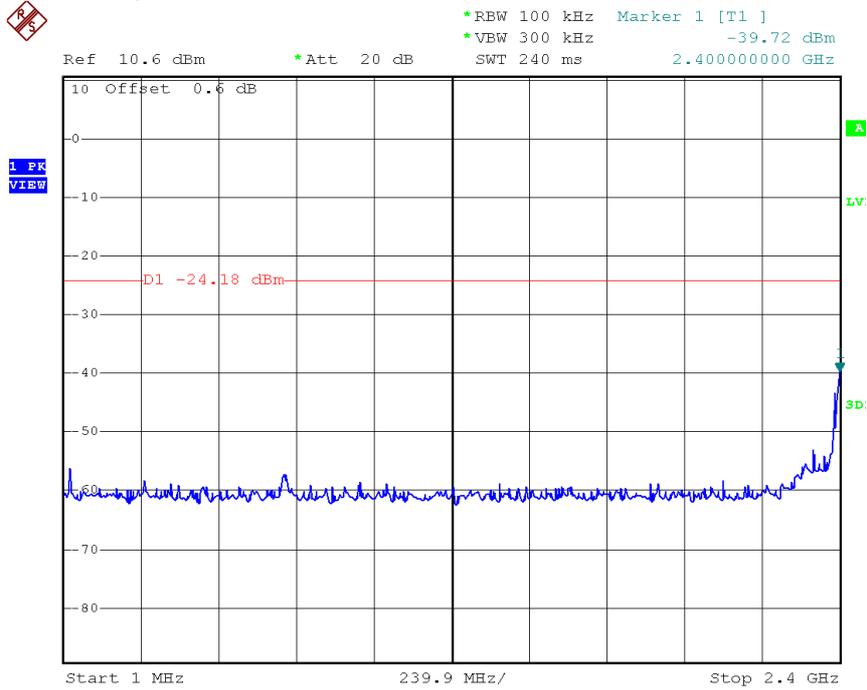
Channel 3 (2422MHz) Reference Level: -1.82dBm ANT 0



TRF no.: FCC 15C\_TX\_b  
 FCC ID: QIS-WS329  
 Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

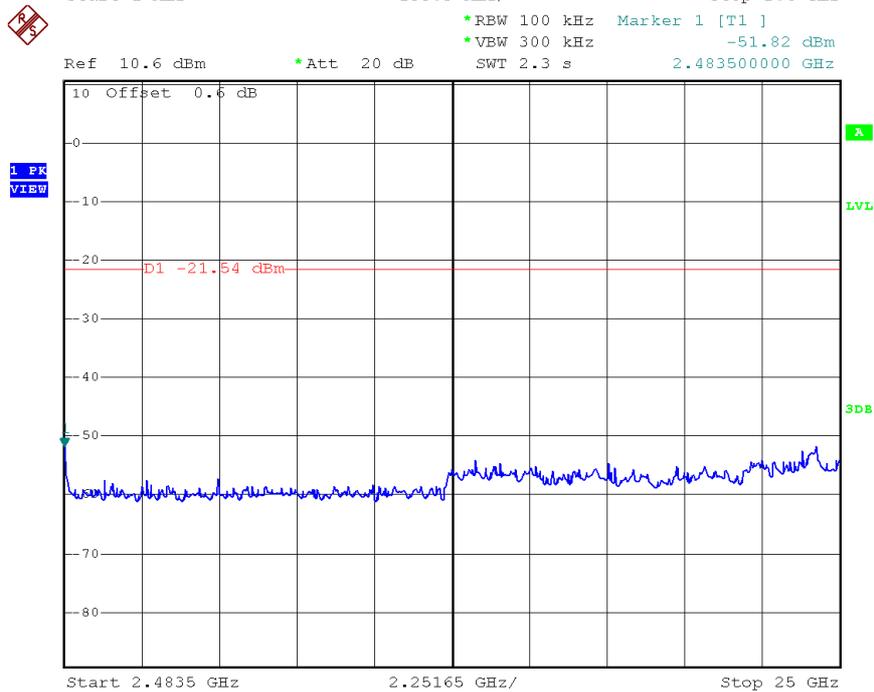
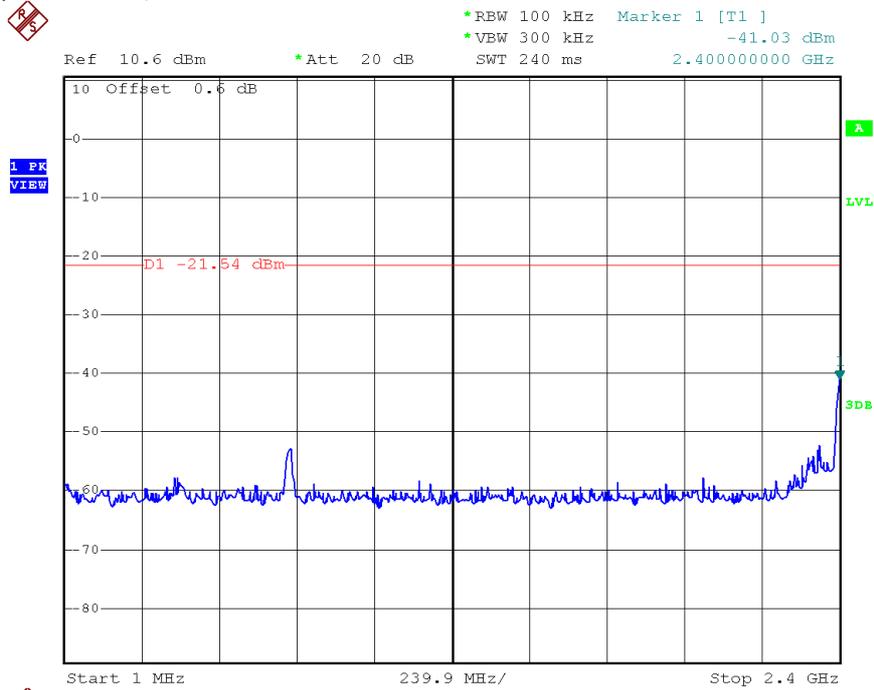
Channel 3 (2422MHz) Reference Level: -4.18dBm ANT 1



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

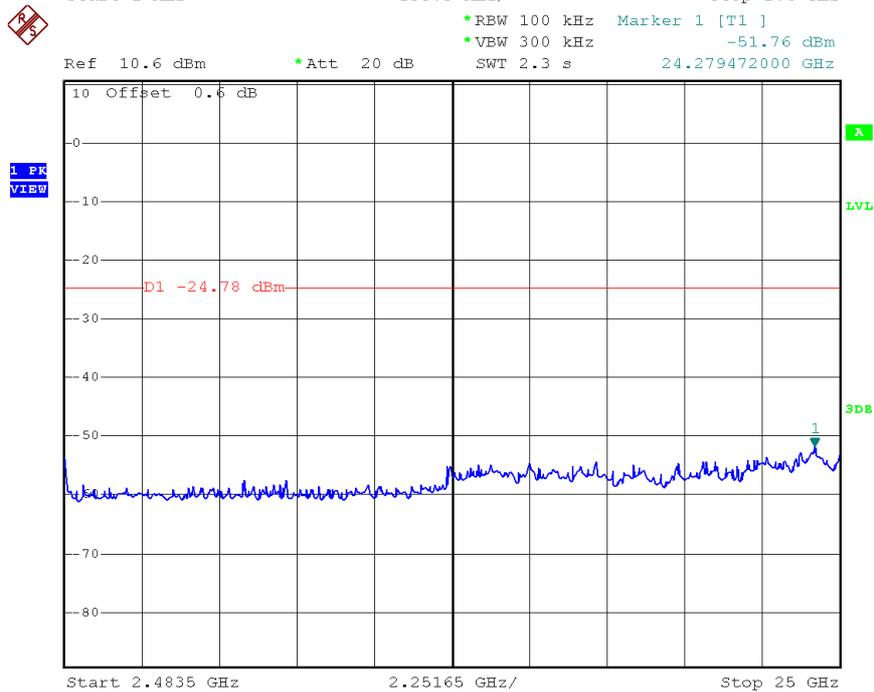
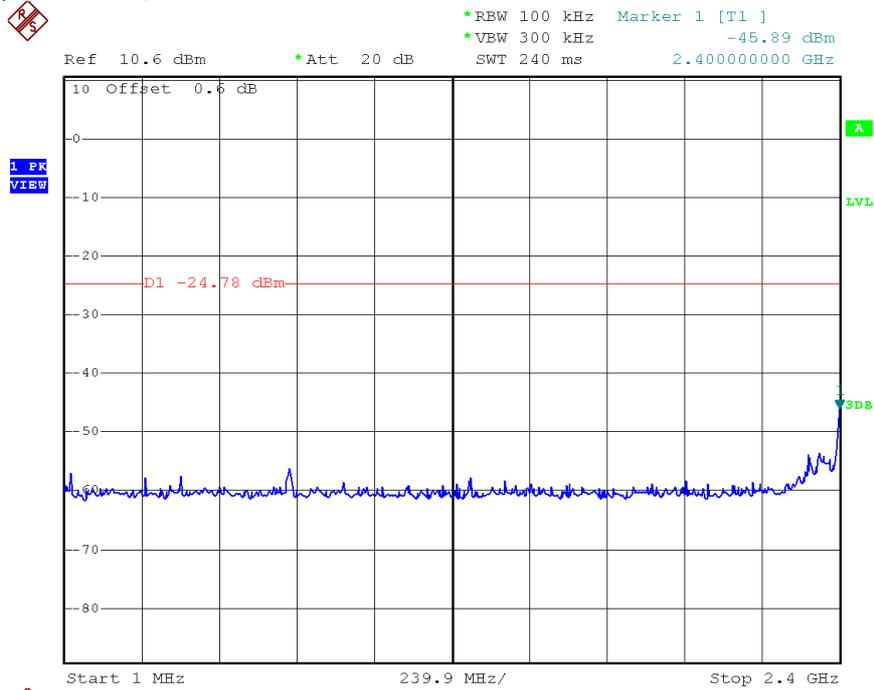
Channel 6 (2437MHz) Reference Level: -1.54dBm ANT 0



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

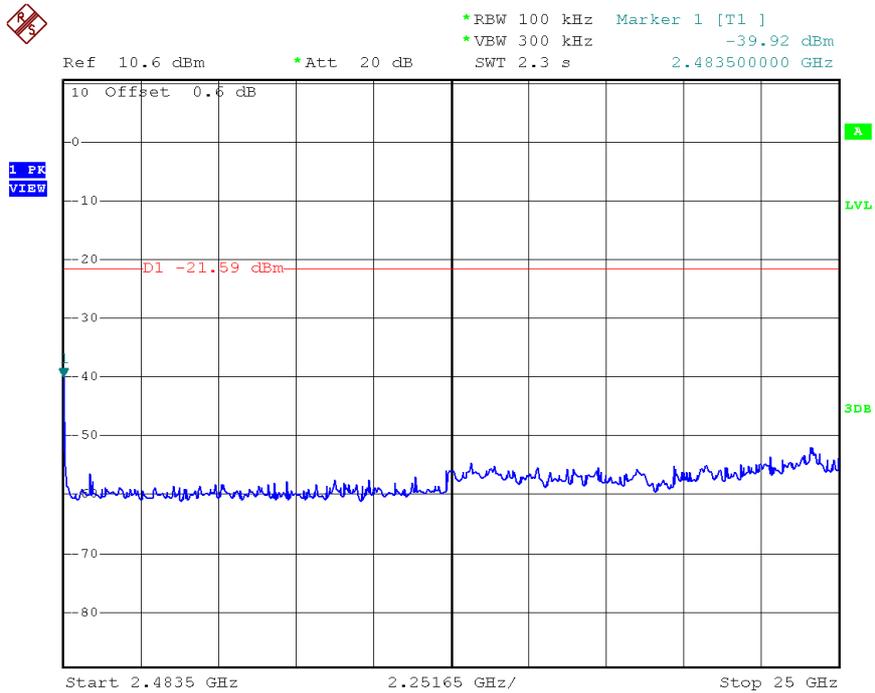
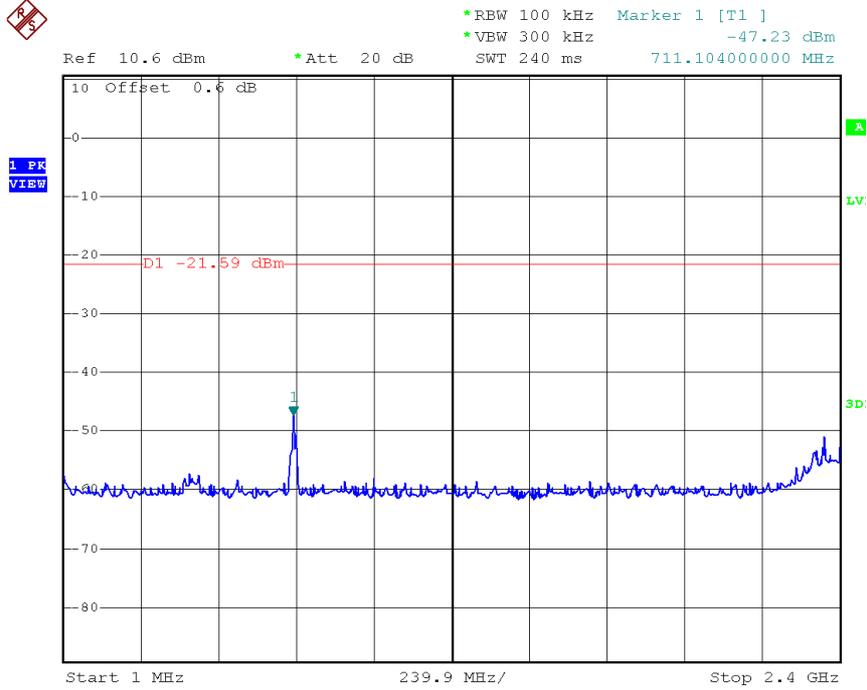
Channel 6 (2437MHz) Reference Level: -4.78dBm ANT 1



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

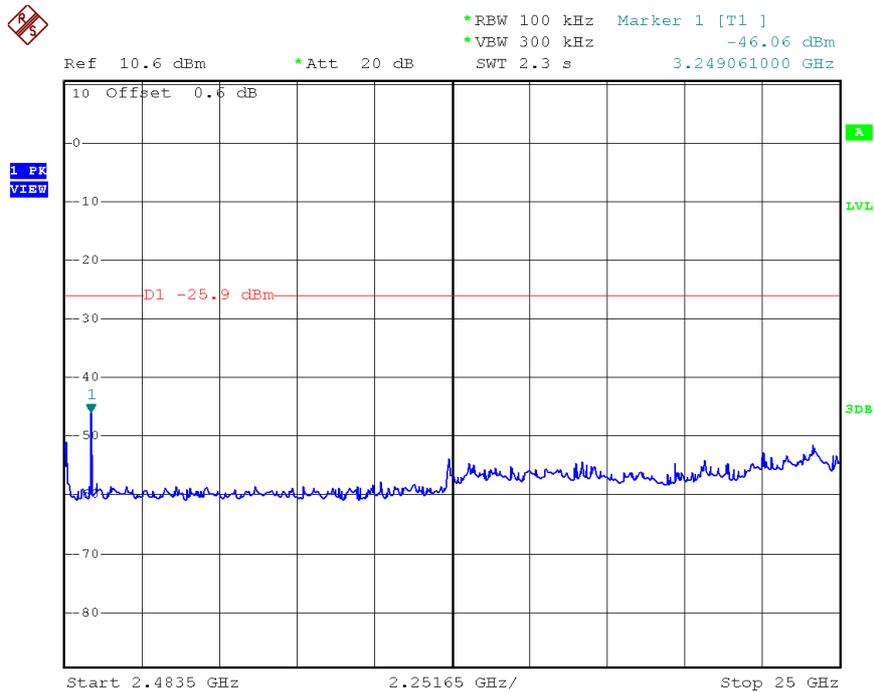
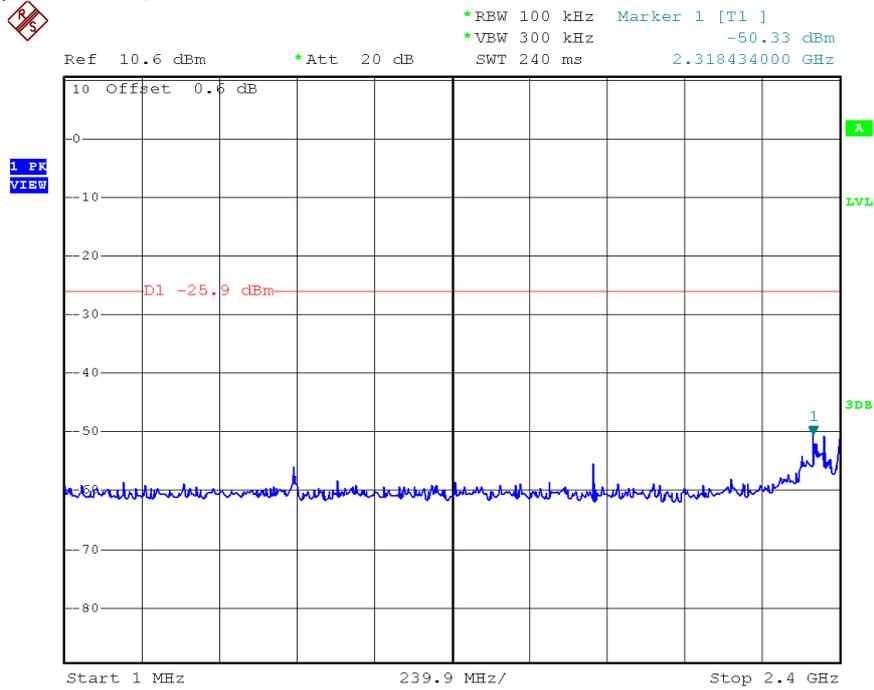
Channel 9 (2452MHz) Reference Level: -1.59dBm ANT 0



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

# INTERTEK TESTING SERVICES

Channel 9 (2452MHz) Reference Level: -5.90dBm ANT 1



TRF no.: FCC 15C\_TX\_b  
FCC ID: QIS-WS329  
Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 23 April 2013  
Model: WS329

### 4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

- Not required, since all emissions are more than 20dB below fundamental  
 See attached data sheet

## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.      Date of Test: 23 April 2013  
Model: WS329

### 4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.      Date of Test: 23 April 2013  
Model: WS329

### 4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD$$

Where      FS = Field Strength in dB $\mu$ V/m  
             RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V  
             CF = Cable Attenuation Factor in dB  
             AF = Antenna Factor in dB  
             AG = Amplifier Gain in dB  
             PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD$$

#### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 62.0 dB $\mu$ V  
AF = 7.4 dB  
CF = 1.6 dB  
AG = 29.0 dB  
PD = 0 dB  
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dB $\mu$ V/m

Level in mV/m = Common Antilogarithm [(42 dB $\mu$ V/m)/20] = 125.9  $\mu$ V/m

## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.  
Model: WS329

Date of Test: 23 April 2013

### 4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (802.11g) at 125.005MHz is passed by 4.9 dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.      Date of Test: 23 April 2013

Model: WS329

Worst Case Operating Mode: 802.11g (TX-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	125.060	39.9	20.0	7.2	27.1	43.5	-16.4
Horizontal	499.965	41.2	20.0	18.4	39.6	46.0	-6.4
Horizontal	958.290	33.1	20.0	26.3	39.4	46.0	-6.6
Vertical	125.005	51.4	20.0	7.2	38.6	43.5	-4.9
Vertical	166.706	47.3	20.0	10.1	37.4	43.5	-6.1
Vertical	800.180	34.3	20.0	23.7	38.0	46.0	-8.0

- NOTES:
1. Quasi-Peak detector is used except for others stated.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. All emissions are below the QP limit.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11b (TX-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	52.7	36.1	34.1	50.7	74.0	-23.3
Horizontal	*2389.920	75.7	36.7	27.2	66.2	74.0	-7.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	41.4	36.1	34.1	39.4	54.0	-14.6
Horizontal	*2389.920	57.7	36.7	27.2	48.2	54.0	-5.8

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \*
- Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11b (TX-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	51.9	36.1	34.5	50.3	74.0	-23.7
Horizontal	*7311.000	50.4	35.6	37.1	51.9	74.0	-22.1

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	40.8	36.1	34.5	39.2	54.0	-14.8
Horizontal	*7311.000	36.8	35.6	37.1	38.3	54.0	-15.7

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.      Date of Test: 23 April 2013

Model: WS329

Mode: 802.11b (TX-Channel 11)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	50.8	36.1	34.7	49.4	74.0	-24.6
Horizontal	*2483.550	77.7	36.7	27.7	68.7	74.0	-5.3

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	40.5	36.1	34.7	39.1	54.0	-14.9
Horizontal	*2483.550	57.2	36.7	27.7	48.2	54.0	-5.8

- NOTES: 1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11g (TX-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	51.7	36.1	34.1	49.7	74.0	-24.3
Horizontal	*2388.940	77.3	36.7	27.2	67.8	74.0	-6.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	36.2	36.1	34.1	34.2	54.0	-19.8
Horizontal	*2388.940	57.0	36.7	27.2	47.5	54.0	-6.5

- NOTES: 1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11g (TX-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	50.2	36.1	34.5	48.6	74.0	-25.4
Horizontal	*7311.000	51.0	35.6	37.1	52.5	74.0	-21.5

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	34.3	36.1	34.5	32.7	54.0	-21.3
Horizontal	*7311.000	36.9	35.6	37.1	38.4	54.0	-15.6

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11g (TX-Channel 11)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	50.8	36.1	34.7	49.4	74.0	-24.6
Horizontal	*7386.000	50.9	35.6	37.2	52.5	74.0	-21.5
Horizontal	*2483.540	76.2	36.7	27.7	67.2	74.0	-6.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	35.3	36.1	34.7	33.9	54.0	-20.1
Horizontal	*7386.000	36.8	35.6	37.2	38.4	54.0	-15.6
Horizontal	*2483.540	56.5	36.7	27.7	47.5	54.0	-6.5

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11n-20M (MIMO) (TX-Channel 01)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	51.7	36.1	34.1	49.7	74.0	-24.3
Horizontal	*2388.253	75.7	36.7	27.2	66.2	74.0	-7.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4824.000	35.7	36.1	34.1	33.7	54.0	-20.3
Horizontal	*2388.253	58.7	36.7	27.2	49.2	54.0	-4.8

NOTES: 1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

5. 11n-HT20 and 11n-HT20 (MIMO) are tested. Only the worst case data was reported.

\* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11n-20M (MIMO) (TX-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	49.6	36.1	34.5	48.0	74.0	-26.0
Horizontal	*7311.000	51.1	35.6	37.1	52.6	74.0	-21.4

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	34.7	36.1	34.5	33.1	54.0	-20.9
Horizontal	*7311.000	37.9	35.6	37.1	39.4	54.0	-14.6

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
  5. 11n-HT20 and 11n-HT20 (MIMO) are tested. Only the worst case data was reported.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11n-20M (MIMO) (TX-Channel 11)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	50.1	36.1	34.7	48.7	74.0	-25.3
Horizontal	*7386.000	50.6	35.6	37.2	52.2	74.0	-21.8
Horizontal	*2483.545	76.8	36.7	27.7	67.8	74.0	-6.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4924.000	35.1	36.1	34.7	33.7	54.0	-20.3
Horizontal	*7386.000	37.7	35.6	37.2	39.3	54.0	-14.7
Horizontal	*2483.545	55.5	36.7	27.7	46.5	54.0	-7.5

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
  5. 11n-HT20 and 11n-HT20 (MIMO) are tested. Only the worst case data was reported.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11n-40M (MIMO) (TX-Channel 03)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4844.000	48.5	36.1	34.6	47.0	74.0	-27.0
Horizontal	*2389.570	69.7	36.7	27.2	60.2	74.0	-13.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4844.000	34.4	36.1	34.6	32.9	54.0	-21.1
Horizontal	*2389.570	56.1	36.7	27.2	46.6	54.0	-7.4

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
  5. 11n-HT40 and 11n-HT40 (MIMO) are tested. Only the worst case data was reported.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11n-40M (MIMO) (TX-Channel 06)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	47.6	36.1	34.8	46.3	74.0	-27.7
Horizontal	*7311.000	50.9	35.6	37.3	52.6	74.0	-21.4

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4874.000	34.1	36.1	34.8	32.8	54.0	-21.2
Horizontal	*7311.000	36.5	35.6	37.3	38.2	54.0	-15.8

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
  5. 11n-HT40 and 11n-HT40 (MIMO) are tested. Only the worst case data was reported.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

Applicant: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Mode: 802.11n-40M (MIMO) (TX-Channel 9)

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4904.000	47.8	36.1	34.8	46.5	74.0	-27.5
Horizontal	*7356.000	49.7	35.6	37.4	51.5	74.0	-22.5
Horizontal	*2483.470	69.2	36.7	27.7	60.2	74.0	-13.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	*4904.000	34.6	36.1	34.8	33.3	54.0	-20.7
Horizontal	*7356.000	36.2	35.6	37.4	38.0	54.0	-16.0
Horizontal	*2483.470	54.8	36.7	27.7	45.8	54.0	-8.2

- NOTES:
1. Peak detector is used for the emission measurement (RBW=1MHz, VBW=3MHz for Peak data; RBW=1MHz, VBW=10Hz for Average data).
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
  5. 11n-HT40 and 11n-HT40 (MIMO) are tested. Only the worst case data was reported.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

TRF no.: FCC 15C\_TX\_b

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## INTERTEK TESTING SERVICES

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### 4.9 Conducted Emission

Worst Case Neutral-Conducted emission at 0.362 MHz is Passed by 3.2 dB margin

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

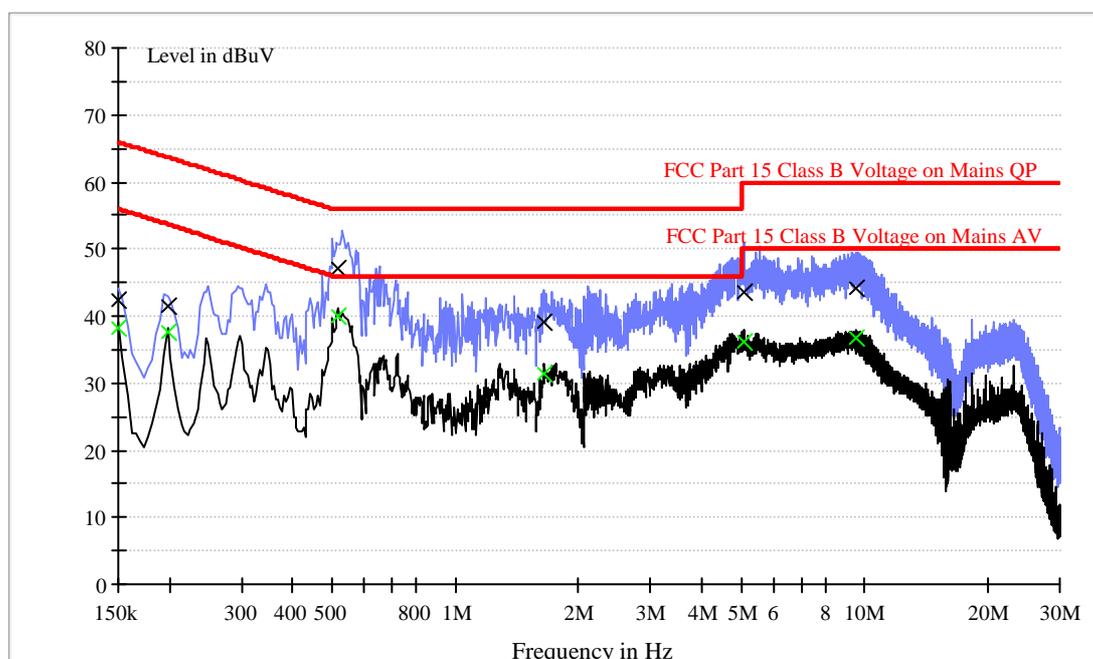
## INTERTEK TESTING SERVICES

Company: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 23 April 2013

Model: WS329

Worst Case Operating Mode: 802.11g (TX-Channel 01)

### Conducted Emission Test - FCC



### Result Table QP

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150	42.3	L1	9.6	23.7	66.0
0.198	41.5	L1	9.6	22.2	63.7
0.518	47.2	L1	9.6	8.8	56.0
1.654	39.0	L1	9.7	17.0	56.0
5.058	43.5	L1	9.8	16.5	60.0
9.514	44.2	L1	9.9	15.8	60.0

### Result Table AV

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150	38.3	L1	9.6	17.7	56.0
0.198	37.8	L1	9.6	15.9	53.7
0.518	39.9	L1	9.6	6.1	46.0
1.654	31.4	L1	9.7	14.6	46.0
5.058	36.1	L1	9.8	13.9	50.0
9.514	36.6	L1	9.9	13.4	50.0

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

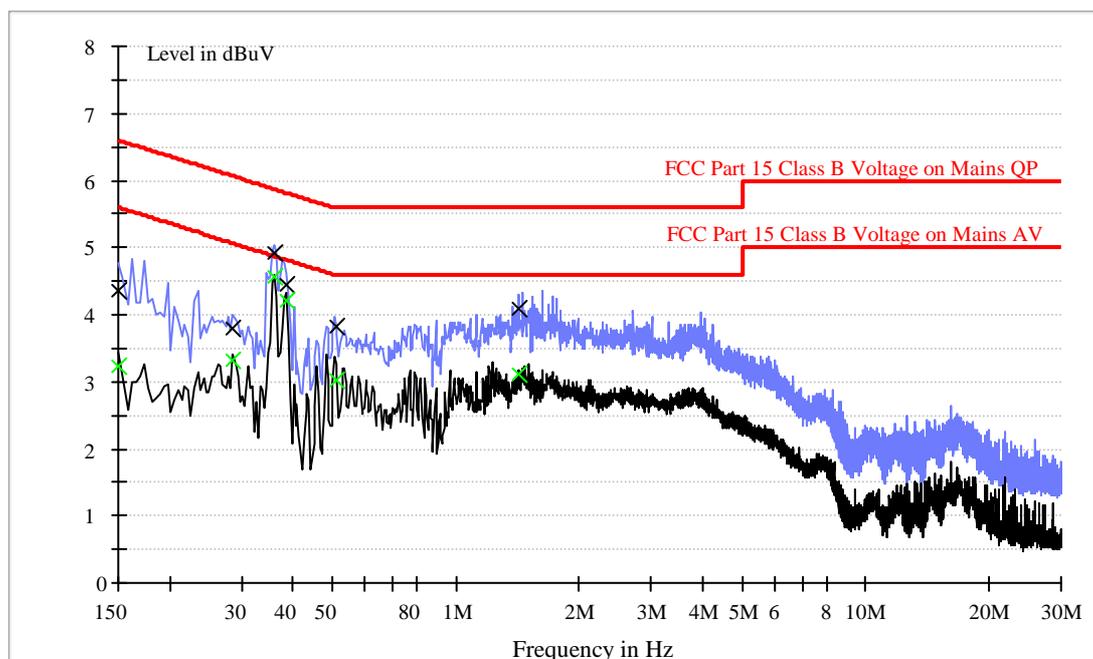
Company: HUAWEI TECHNOLOGIES CO., LTD.

Date of Test: 23 April 2013

Model: WS329

Worst Case Operating Mode: Transmit (802.11n-HT40 MIMO 2422MHz)

### Conducted Emission Test - FCC



### Result Table QP

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150	43.5	N	9.7	22.5	66.0
0.286	37.8	N	9.7	22.8	60.6
0.362	49.3	N	9.6	9.4	58.7
0.386	44.6	N	9.6	13.5	58.1
0.510	38.1	N	9.6	17.9	56.0
1.422	40.8	N	10.0	15.2	56.0

### Result Table AV

Frequency (MHz)	Average (dB $\mu$ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150	32.4	N	9.7	23.6	56.0
0.286	33.1	N	9.7	17.5	50.6
0.362	45.5	N	9.6	3.2	48.7
0.386	42.1	N	9.6	6.0	48.1
0.510	30.2	N	9.6	15.8	46.0
1.422	31.2	N	10.0	14.8	46.0

TRF no.: FCC 15C\_TX\_b

FCC ID: QIS-WS329

Report No.: 130410015SZN-002

## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD. Date of Test: 23 April 2013  
Model: WS329

### 4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

- Not required - No digital part
- Test results are attached
- Included in the separated report.

## INTERTEK TESTING SERVICES

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Applicant: HUAWEI TECHNOLOGIES CO., LTD.  
Model: WS329

Date of Test: 23 April 2013

### 4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 5**

**EQUIPMENT PHOTOGRAPHS**

## INTERTEK TESTING SERVICES

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### 5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.doc & internal photos.pdf.

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 6**

### **PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

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### 6.0 Product Labelling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 7**  
**TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

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### 7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 8**

### **INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

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### 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 9**

### **MISCELLANEOUS INFORMATION**

## INTERTEK TESTING SERVICES

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### 9.0 **Discussion of Pulse Desensitization**

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 10**

### **TEST EQUIPMENT LIST**

## INTERTEK TESTING SERVICES

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### 10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	30-Jun-12	30-Jun-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	12-Mar-13	12-Mar-14
SZ061-09	Horn Antenna	ETS	3115	00092346	28-Nov-12	28-Nov-13
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	26-Feb-13	26-Aug-13
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-May-12	11-May-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	12-Mar-13	12-Mar-14
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	12-Mar-13	12-Mar-14
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2-Mar-13	2-Mar-14
SZ062-02	RF Cable	RADIALL	RG 213U	--	26-Feb-13	26-Aug-13
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	14-Jul-13	14-Jan-14
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	29-Dec-12	29-Jun-13
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	11-Jun-12	11-Jun-13
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	5-Nov-12	5-Nov-13
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	5-Nov-12	5-Nov-13
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	5-Nov-12	5-Nov-13
SZ188-03	Shielding Room	ETS	RFD-100	4100	10-Sep-12	10-Sep-13